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THE NATURALIST

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of Natural History for the North of England

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THE NATURALIST

FOR 1975

THE BIOGEOGRAPHY OF SNAILS IN YORKSHIRE

L. LLOYD-EVANS

Presidential Address to the Yorkshire Naturalists' Union, York, 7th December 1974

During the past few years conchologists, like botanists and ornithologists, have been busy mapping the distribution of species in Great Britain and Ireland on a 10-kilometre square basis. This is a project ideally suitable for amateur network research as enthusiasm can be kindled by setting definite targets and kept aglow by regular progress reports. Our Conchological Section has played its full part in this mapping scheme and in the process has added two species new to the British list.

The first was *Vitrea diaphana*, found by one of our members in 1966 at Oxenber Wood and subsequently at several other sites near Austwick in the Craven district of Yorkshire (Kerney and Fogan, 1969). This tiny snail closely resembles two other species of the same genus found widespread in Britain and could easily be overlooked. Indeed it had been overlooked, for after its discovery a collection made at Malham Tarn Field Centre in 1955 was re-examined critically and two specimens of the new species were found in it. During the next few years further sites for *V. diaphana* were established in Yorkshire, all on Carboniferous Limestone, usually either among boulders in open woodland or near unstable scree on limestone grassland.

V. diaphana is a montane snail and its main distribution lies in the mountains of Southern Europe including the Pyrenees, Juras, Alps and Carpathians. It is a hardy little animal, found in the Alps at altitudes up to 2,400m. just below the level of perpetual snow. A few isolated stations are known to the north, such as the Teutoburger Wald and Harz Mountains in Germany but it is absent from the plains of northern Europe. So what is this alpine snail doing in Yorkshire, and how and when did it get here? In seeking answers to such questions we usually turn first to the fossil record. One advantage of studying snails is that, like pollen grains and teeth and bones, snail-shells make good fossils. In this case, unfortunately, we draw a blank; *V. diaphana* has not yet been found fossil in Britain, though no doubt it soon will be now that the palaeontologists know what to look for. Meanwhile we can compare *V. diaphana* with another montane snail, *Abida secale*, for which the fossil record is more complete and which has a very similar distribution in Yorkshire to *V. diaphana*; they were, indeed, both found together on Stockdale Fell near Feizor. *Abida secale* now has a very patchy distribution in Britain, mainly in bleak open places with little vegetation cover and a lot of bare calcareous rock; but the fossil record shows that it was one of the earliest molluscan colonists of the bare ground left as the snowcaps and glaciers of the last Ice Age retreated and that it was then common in areas of lowland Britain where it is now no longer found (Kerney, 1962). Snails and plants adapted to the bleak open-ground conditions of tundra and mountain tops would be swamped by the dense forests and blanket bogs that developed as the climate changed when Britain became an island. They could survive as relict species only on refuges like the steep, unstable limestone slopes of the Craven limestone district and of Upper Teesdale; and so we can find *V. diaphana* under the cliffs of Penyghent that are festooned with another alpine refugee — the Purple Saxifrage *(Saxifraga oppositifolia)*.

Our second addition to the British list, the slug *Boettgerilla pallens*, was actually first found in the Lake District, but as it was found by one of our members from Leeds and identified by another of our members from Hull, I think I am justified in speaking

about it today (Colville, Lloyd-Evans and Norris, 1974). *B. pallens* was first discovered at the beginning of this century on the well-wooded southern slopes of the Caucasus Mountains near the Black Sea port of Sukhumi in Transcaucasia, that rich sub-tropical region of the U.S.S.R. where bamboos shoot up a metre a day and roses bloom in mid-winter. For over 40 years there were no additions to this range, then in the mid 1950's numerous new records appeared, first from the mountainous areas of Central Europe in Poland, Czechoslovakia, Switzerland, Austria and South Germany then later from the northern plains of Germany, France, Belgium, Holland and Finland. Most of these new records were from rather artificial habitats where the environment had been drastically modified or simplified by man; *B. pallens* spends most of its life underground and was found under planks, bricks, rubble or compost heaps in gardens or town parks, often in greenhouses, sometimes in well-housings or cellars and once in the casing of an underground telephone cable. Usually there was a strong indication of unwitting transport by human agency; sometimes there was no doubt about this as when *B. pallens* was found near Ostrava in heaps of iron ore imported from the Soviet Union for the steel mills of Czechoslovakia (Schmid, 1963).

In Britain *B. pallens* was first found by the shore of Lake Windermere in what looks like a fairly natural habitat of moist woodland among obviously native plants like Toothwort *(Lathraea squamaria)* and Wordsworth's Wild Daffodils *(Narcissus pseudonarcissus)*. Admittedly tourists often visit the spot but the means of transport by human agency was not at all obvious. Some time later another colony was located, this time in a field just beside the car-park and picnic site of a popular National Trust beauty spot attracting numerous visitors from the Continent. *B. pallens* might have arrived as eggs or juveniles in mud on footwear or on the wheels and mudguards of cars or caravans. Finally, the most likely source of all was located when more specimens of *B. pallens* were found at a garden centre near Windermere where rooted plants are imported from Holland.

Conchologists were alerted to look out for this new addition to our fauna and soon afterwards another locality was reported — from the shores of Strangford Lough in Northern Ireland. *B. pallens* has successfully crossed another sea.

Another interesting addition to the molluscs of Yorkshire is the slug, *Agriolimax agrestis*. This is closely related to and easily confused with the notorious "grey field slug", *A. reticulatus*. There are minor differences in external characters but the identification really needs to be confirmed by dissection, so our knowledge of its distribution is still incomplete.

A. agrestis was first described in Britain from Wheatfen Broad in Norfolk where it revels in the lush marginal vegetation, particularly of tall umbellifers like Angelica *(Angelica sylvestris)* and Milk Parsley *(Peucedanum palustre)*, the food-plant of the Swallow-tail; it shelters from sun and wind in the inflated bases of their leaf-stalks, browses on their flower-heads or climbs their tall stems to safety when high spring tides flood up the River Yare and the water-level rises on the Broad (Ellis, 1967). Later *A. agrestis* was found in similar habitats at Surlingham Broad, Alderfen Broad and Sutton Staithe. In Europe its distribution is mainly northern and it is not restricted to marshy habitats. The next confirmed site in Britain was from the Outer Hebrides and it was subsequently found in North-east Scotland and the southern uplands of Scotland. The first records for Yorkshire were from Malham; later it was found near Hawes and in Arkengarthdale. All the Yorkshire stations are on limestone grassland at altitudes up to 565m. It looks as though the distribution of *A. agrestis* in Britain is also mainly northern; perhaps it is retreating before its more successful relation *A. reticulatus*.

After ranging rather widely over Europe and Britain and Yorkshire I would like now to focus down on a small area that I have been studying fairly intensively over the past five years. This the 10-kilometre square 44/20 around Penistone. From the naturalist's point of view it has no exciting rarities, nothing warranting a National Nature Reserve or even a Site of Special Scientific Interest, but it is an oasis of pleasant, unspoilt countryside in a district scarred by industrial development and as such it well deserves study and conservation. Just to the north lies Huddersfield and the conurbation stretching to Leeds; to the east Barnsley and the South Yorkshire coalfield; to the south the steel mills of Sheffield; and over



Figure 1. Distribution of mollusca in tetrads of 10-kilometre square 44/20.

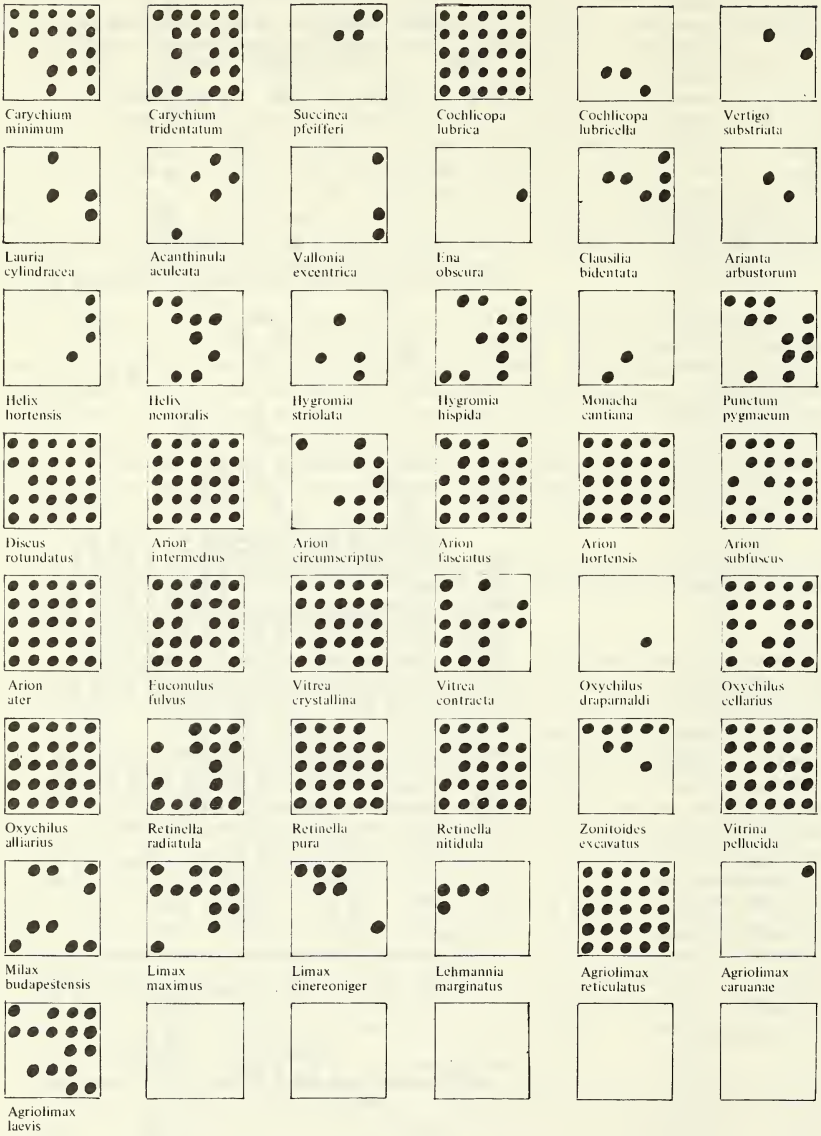


Figure 2a. Tetrad maps of land mollusca, 44/20.

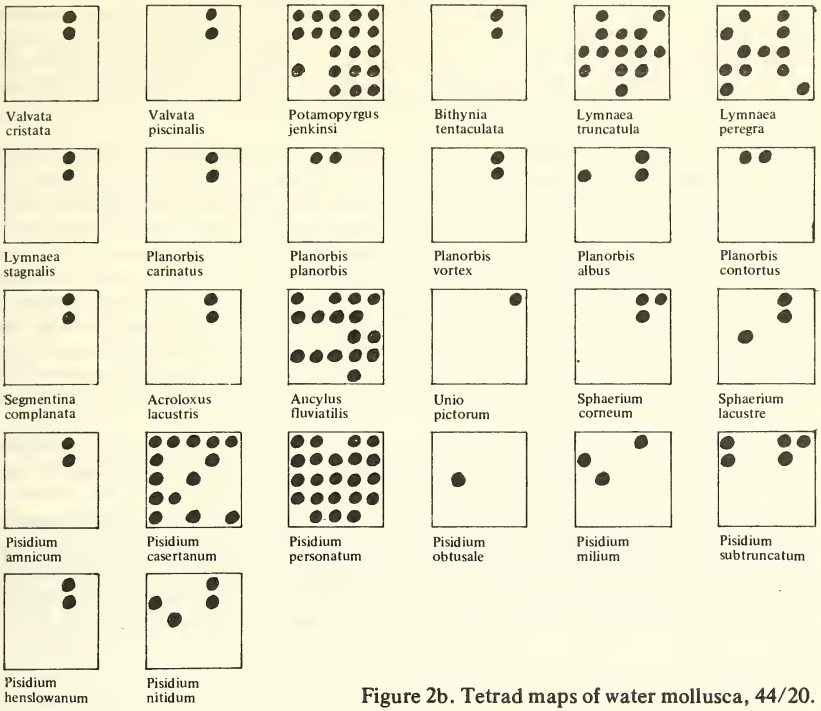


Figure 2b. Tetrad maps of water mollusca, 44/20.

the narrow waist of the Pennines to the west are Manchester and industrial South Lancashire. If ever there were a case for enforcement of the Green Belt policy, this must be it.

First, a little elementary geography — and I would like in passing to pay a tribute to the Ordnance Survey. I doubt if naturalists in Britain are fully aware of how well served they are by cartographers until they try to obtain comparable maps overseas; the O.S. maps, particularly the 1/25,000, are invaluable tools in studying the natural history of a district. My study area lies on the foothills of the Pennines with altitudes ranging from 75m. in the north-east to 350m. in the south-west. From 1901 to 1930 the July mean temperature was 16.0°C, the January mean 4.4°C and the February minimum 1.7°C. Rainfall in the centre of the square averages about 990mm per year, compared with 1,275mm per year at Woodhead in the centre of the Pennines; the climate is evidently temperate, cool and moist and therefore favourable for molluscs. The underlying rocks are all of Carboniferous age; in the extreme south-west of the square at Langsett the Namurian is exposed and Rough Rock of the Millstone Grit has been quarried to construct reservoirs. All the rest of the square lies on the Lower and Middle Coal Measures of the Westphalian, alternating shales, sandstones and seams of coal rising on the flanks of the Pennine anticline with a scarp to the south-west and a dip slope to the north-east. The River Don and its tributary the Little Don river run parallel with the scarp while the dip slope is incised by the headwaters of numerous streams draining into the River Dearne. Coal-measure sandstones such as the Greenmoor Rock, Grenoside Sandstone and Penistone Flags form prominent features of the scenery and are often quarried. Many of the coal seams have been worked out but at Bullhouse Colliery open-cast mining is still productive. Blue clay shales are transformed into conduits and land-drains in kilns made from local fireclay and fired by local Hard Bed coal.

By using a transparent overlay with a 1 hectare square grid on the invaluable 1/25,000 O.S. map it is possible to get a fairly accurate estimate of land use; thus in the Penistone

square about 8% of the area is covered by woodland, mainly deciduous or mixed; fresh water accounts for 1%, and built up areas for about 4.5%. The rest is agricultural land, mainly enclosed pasture with a fair amount of arable and a little rough grazing. Using the 1971 census the approximate human population is found to be 20,000, a density of 2 per hectare; compare this with the nearby borough of Huddersfield with 131,190 people at 23 per hectare.

In his classic paper on the *Habitats of Land Molluscs* Professor Boycott (1934) listed their main requirements as moisture, shelter and lime; only lime is in short supply in my study area and during the past few years 69 species of molluscs have been recorded there, 38% of the British list. It is interesting to compare this percentage with that of other groups; in the same area I have recorded only six species of Dragonflies, 15% of the British list; the total may be low because I recorded only adults and did not make the effort to identify nymphs. According to the preliminary distribution maps of the Biological Records Centre the best 10-kilometre square in Yorkshire is 44/51, Askern, where 14 species of dragonflies have been recorded since 1960, 35% of the British list. Butterflies in the Penistone square score rather better — I have records of 13 species, 22% of the British list. Water Bugs do better still with 19 species, 31% of the British list, and include the interesting boreo-alpine species *Callicorixa wollastoni*.

From 1968 to 1972 the British Trust for Ornithology carried out a survey of birds breeding in Britain with a view to publishing an Ornithological Atlas; the national organizer of their Atlas Project, Dr. G. T. R. Sharrock, has been kind enough to let me see the results for my study area prior to publication. During the survey 214 species were proved to be breeding in Britain; of these 76 (35.5%) were confirmed as breeding in square 44/20; nine more species were probably breeding, bringing the figures up to 85 (40%); ten more possibly breeding make the total 95 (44%). Evidently Penistone is a favourable spot for birds, molluscs and water bugs, but may lack enough warm sunshine for butterflies and dragonflies.

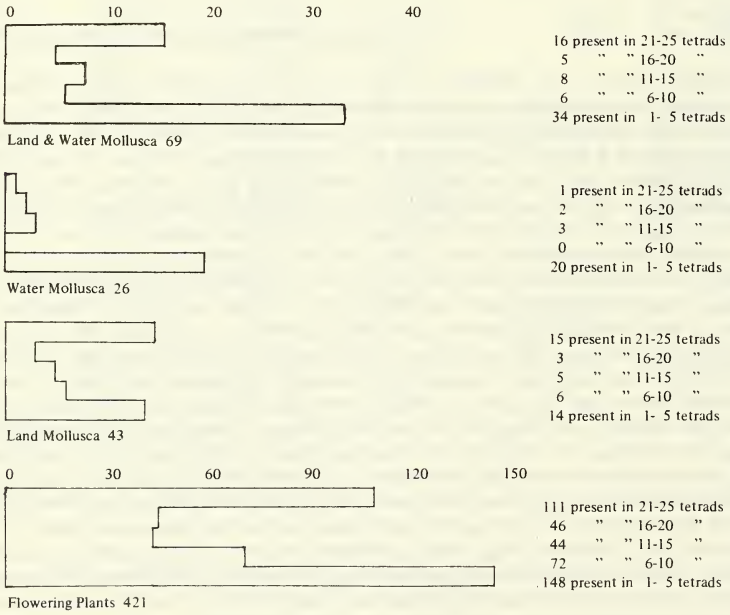


Figure 3. Frequency distribution of species in 44/20.

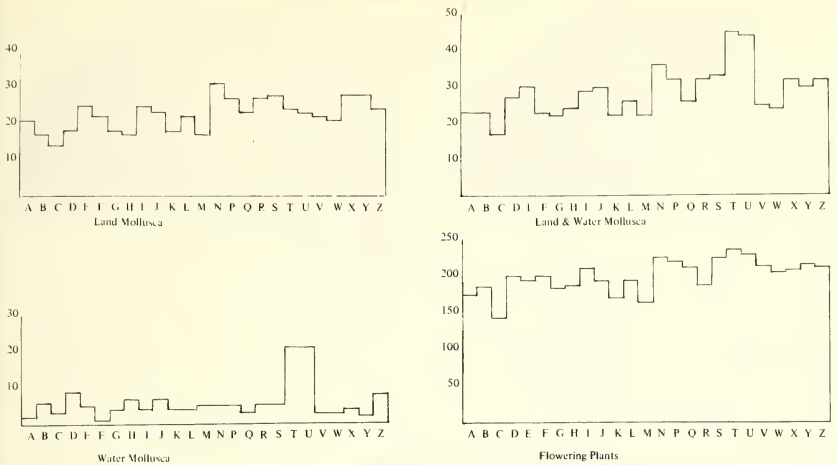
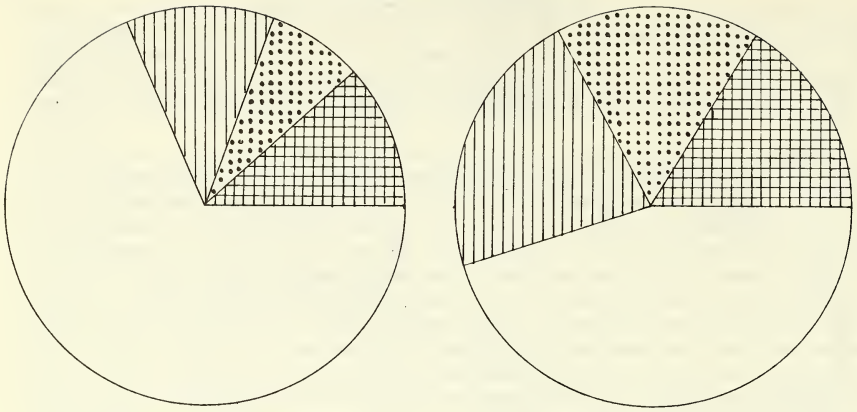


Figure 4. Number of species in tetrads of 44/20.

While Penistone can hardly be called a rich area for flowering plants it may be a good example of an average 10-kilometre square; in the field work for their monumental *Atlas of the British Flora* (Perring and Walters, 1962) members of the Botanical Society of the British Isles amassed a total of 1½ million records from 3,500 10-kilometre squares; that averages out at 428 per 10-kilometre square and my figure for 44/20 is 421 species.

In studying the molluscs and flowering plants of this 10-kilometre square I recorded species on a tetrad basis, familiar to botanists; this subdivides the square into 25 portions of reasonably manageable size, each of which should be visited at least once in spring, summer and autumn to achieve good coverage. The resulting records can be mapped on squared paper for easy display and can be analysed in various ways. (Figs. 1, 2a, 2b). It is instructive to put a numerical value on frequency, listing the numbers of species present in varying numbers of tetrads. Applying this to the plants of 44/20 we find a large number of common species, an even larger number of 'rare' ones and a surprizing shortage of plants of intermediate frequency; this type of distribution is familiar to botanists in other parts of Britain. Applying the same analysis to the molluscs of square 44/20 we find a similar distribution but with an even greater relative number of rarities; this is unexpected, but if we consider land molluscs alone, "common" species slightly exceed "rarities", the distribution often found in other groups of animals (Fig. 3). The distribution of water molluscs in our square is found to be very biassed, many species occurring only in the extremely productive lakes of Cannon Hall park, in tetrads T and U (Fig. 4). These lakes constitute less than 1% of the fresh-water of the Penistone square, but if they were spoilt as a habitat by drainage, silting, pollution or neglect the effect on the fresh-water molluscan fauna of of the Penistone square would be disastrous and nearly 40% of the species would be eliminated. These are the sort of facts conservationists need to support their arguments.

Which are the successful land molluscs around Penistone and why do they succeed? Analysis shows that the families Zonitidae, Arionidae and Limacidae make up over half the total number of species, a much higher proportion than in Britain as a whole; in all three families the shell is reduced or absent, in fact the last two families are slugs (Fig. 5). In land molluscs the shell has two main functions, to protect the animal from enemies and to protect it from desiccation. But the main constituent of the shell is calcium carbonate; if the habitat is moist enought and short of calcium it may pay the animal on balance to economize on its shell. Round Penistone this seems true even in a single genus; *Oxychilus alliarius*, with the smallest shell, occurs in every tetrad, *O. draparnaldi* with the largest shell occurs in only one.



Proportion of total species of land mollusca in families:

	Zonitidae (hatched)	Arionidae (stippled)	Limacidae (cross-hatched)
Great Britain and Ireland	11.7%	7.2%	12.6%
44/20 Penistone	23.1%	14.0%	16.3%

Figure 5. Relative frequency of molluscan families.

Ecologists have long been interested in the species/area relationships of plants and animals and it seemed worth while to consider this aspect of the distribution of molluscs in Yorkshire. From my own data I knew the average number of species in areas of 4km², 20km² and 100km² round Penistone; reliable totals are available for Yorkshire and for the British Isles; to provide figures for areas of intermediate size the recorder of our Conchological Section, Mr. A. Norris, kindly lent me the master-cards of our mapping survey. I chose a block of 64 10-kilometre squares for analysis — and I need hardly add that nowhere else in Britain could one find a solid block of 64 10-kilometre squares within the boundaries of a single county — and obtained average figures for areas of 800, 1,600, 3,200 and 6,400 square kilometres. When the numbers of species were plotted againts units of area the result was an unhelpful curve; but when species numbers were plotted against logarithms of area the result approximated to a straight line. By the method of 'least squares' a regression line was calculated; its correlation coefficient was 0.998, showing a very strong relationship between number of species and area; the standard error was 2.9. This satisfies the relationship first postulated by Gleason (1922) where a constant addition is made to the total of species every time the area is multiplied by the same number (Fig. 6).

Applying a similar analysis to flowering plants, the total for the British Isles was taken from the *List of British Vascular Plants* (Dandy, 1958) as 2,137, omitting microspecies, subspecies and hybrids; from my data the total for the 10-kilometre square was 421 and for an average tetrad 200; in the *Atlas of the British Flora* the same Yorkshire block of 64 10-kilometre squares gave a total of 1,088. Plotted as before on a species norm/log area basis the result was curvilinear, but plotting log species against log area gave an approximately straight line. This satisfied the relationship first suggested by Arrhenius (1920) which is generally found to apply to plants rather than to animals (Fig. 7). Anyone interested in this rather abstruse subject should consult the writings of that outstanding field botanist, Dr. John Dony (1963, 1971).

It is important to realize that the distribution of molluscs in Britain is constantly changing and some of these changes can be illustrated from our study square. In *The Naturalist* of 1893 the conchologist Lionel Adams published a list of the molluscs he had collected within

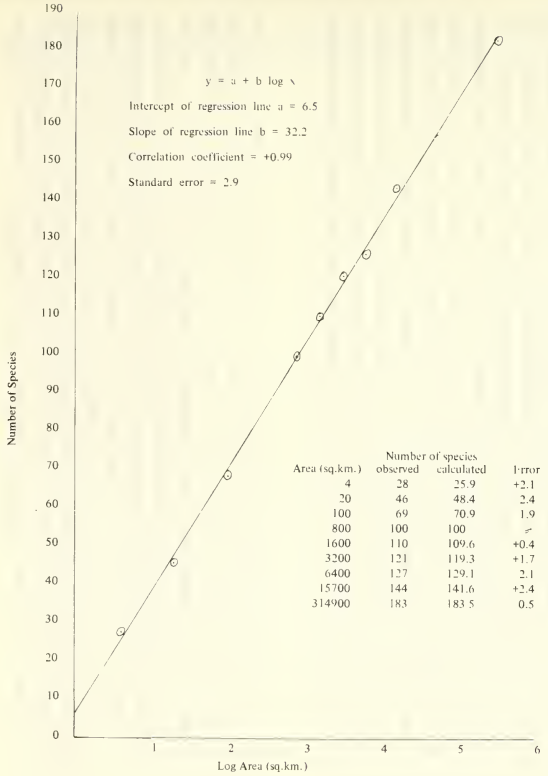


Figure 6. Species/area relationship — mollusca.

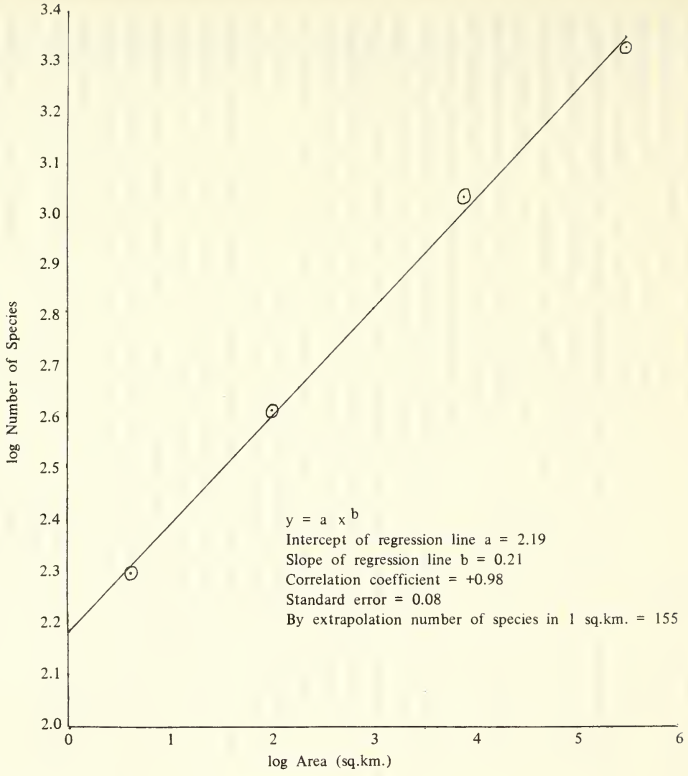


Figure 7. Species/area relationship — flowering plants.

five miles of Penistone during the period of his residence there from January 1889 to December 1892 (Adams, 1893). In the ensuing eighty years there have been few losses and many gains. Adams recorded the local water snail *Lymnaea glabra* from a pond at Thurgoland: this may have disappeared along with its habitat. In Gunthwaite Wood he found single specimens of *Vertigo substriata* and *Columella edentula*; the former is still there, and probably the latter too, but I have not yet been able to re-find it. On the other hand Adams made no mention of *Potamopyrgus jenkinsi*, *Hygromia striolata*, *Monacha cantiana*, *Oxychilus draparnaldi*, *Milax budapestensis* or *Agriolimax caruanae*, all of which have reached the Penistone area since his day. *P. jenkinsi* is now one of the commonest water snails, recorded in 20 out of 25 tetrads; it was first recorded as a brackish water snail in the Thames estuary in 1883. Ten years later it was first found in fresh water, and during the next decade it became quite common in ponds, lakes and reservoirs in the London area. This was the time when ornithologists were recording with surprize and excitement the changed behaviour of another invader from the Thames estuary: the Black-headed Gull *(Larus ridibundus)* was visiting London and moving inland for the first time; the gull feeding on the estuary and roosting on the reservoirs may well have helped the snail on its way (Castell, 1962). Once arrived in fresh water *P. jenkinsi* was well adapted for a rapid spread — a single parthenogenetic, viviparous female could found a colony.

Hygromia striolata is native in woodlands of southern Britain but in the north, especially in 'acid' districts, it is found mainly near houses and gardens. Other 'garden' species doubtless introduced by man are *Oxychilus draparnaldi*, found only in one tetrad at Oxspring and the slug *Agriolimax caruanae*, found only near a vegetable garden at Cawthorne. The other slug, *Milax budapestensis* is more widespread and occurs far from houses but only where convenient stopping places tempt motorists to dump garden rubbish in woods or hedge-bottoms. *Monacha cantiana* is a fairly recent colonist of Britain from the south; the earliest well-dated site is a 3rd century A.D. Roman villa at Lullingstone in Kent; it likes well-drained open soils, preferably calcareous, with fairly tall vegetation and occurs only in two tetrads on roadside verges.

The Penistone square has no real molluscan rarities but the magnificent slug, *Limax cinereoniger* is well distributed, occurring in six tetrads. It is considered a good indicator of primeval woodland and is common at Gunthwaite — the name has nothing to do with guns but is Old Norse for Gunhilldr's Clearing in the forest. The tree slug, *Lehmannia marginata* is rather uncommon; it climbs trees to feed on algae and lichens and round Penistone its diet must be rather restricted: the only lichen found commonly more than one metre up tree trunks is *Lecanora conizaeoides* which is very tolerant of atmospheric sulphur dioxide.

In many tetrads of the Penistone square fresh-water habitats were scarce and I found it profitable to sample water troughs provided for cattle and horses. These varied in size from monsters of more than three cubic metres capacity to miniatures of less than 3/100 of a cubic metre. In construction some were hand-hewn masterpieces in sandstone or millstone grit, others mass-produced in concrete or galvanized iron and several extemporized from discarded baths or cisterns. They varied also in rate of flow and degree of silting. Some had quite a rich marginal vegetation and even floating aquatic plants such as duckweed *(Lemna minor)* and Starwort *(Callitriche stagnalis)*; the commonest bryophyte was *Eurhynchium riparioides*.

In a sample of 20 water troughs six species of molluscs were found; it is notable that these were also the six commonest species in the area as a whole. Most frequent was *Pisidium personatum* with 13 occurrences, followed by *P. casertanum* (7), *Potamopyrgus jenkinsi* (6), *Lymnaea peregra* (2), *L. truncatula* (1), and *Ancylus fluviatilis* (1).

In his classic book on *The Dispersal of Shells,* Kew (1893) gives numerous records from troughs of *Lymnaea peregra* and *L. truncatula*; the latter has been found with *Potamopyrgus jenkinsi* in donkey troughs on the Greek island of Tinos in the Aegean (Fielding and Edmunds, 1974). *Ancylus fluviatilis* was reported from a trough in the Lake District (Macan, 1963) whilst *Pisidium personatum* has been recorded from a cattle trough near sea-level in Cheshire (McMillan, 1963) and from St. Brendan's Well near the summit of Brandon Mt., at 820m. probably the highest available habitat for water molluscs in Ireland (Stelfox,

1929). I have not yet found a reference in the literature for *P. casertanum* but one would confidently expect it to occur in troughs as it is the most adaptable and widespread of our water molluscs.

The intriguing question is how mollusca ever reach such small and isolated habitats. Some might arrive with the water supply but this is unlikely in troughs fed by underground springs or piped water-mains. Molluscs are undoubtedly transported by birds; for instance, *Vitrina pellucida* has been found stuck to the plumage of a Meadow Pipit *(Anthus pratensis)* in the Outer Hebrides, a Hooded Crow *(Corvus corone cornix)* in the Faeroes, a Chaffinch *(Fringilla coelebs)* and a Greenland Wheatear *(Oenanthe oenanthe leucorrhoa)* at Fair Isle, and a Northern Waterthrush *(Seiurus noveboracensis)* mist-netted at St. Agnes, Isles of Scilly (Williamson, Parslow and Dance, 1959).

Vitrina pellucida is a land snail but in America marsh snails of the genus *Succinea* have been found on the plumage of migrating American Woodcock *(Philohela minor)*, Wilson's Snipe *(Capella gallinago delicata)*, Whip-poor-will *(Caprimulgus vociferus)*, Bobolink *(Dolichonyx oryzivorus)* and Western Vesper Sparrow *(Pooecetes gramineus confinis)* whilst water snails of the genus *Physa* have been recorded on the Upland Plover *(Bartramia longicauda)* (Dundee, Phillips and Newsom, 1966). *Potamopyrgus jenkinsi* and *Pisidium casertanum*, both of which occur in our troughs, have been found tangled in water-weed on the bill of a Scaup *(Aythya marila)* shot in Scotland (Coates, 1922).

In water troughs more likely vectors are flying insects. Live *Pisidia* have frequently been found attached to the limbs of water bugs and water beetles and it has been shown by laboratory experiment that Corixids are quite capable of flying out of water in small containers with *Pisidia* attached (Fernando, 1954). In my series of 20 troughs *Hesperocorixa sahlbergi* and *Sigara nigrolineata* occurred once each but dytiscid beetles were more common, with *Agabus nebulosus* occurring once, *A. guttatus* twice and *A. bipustulatus* three times.

Out of eight species of *Pisidia* present in the 10-kilometre square only two species were found in troughs; this suggests that environmental conditions and not the accidents of transport and arrival control the composition of the populations.

If this afternoon I have strayed a little from the narrow confines of conchology and trespassed in other fields, I hope I may be forgiven. In this age of increasing specialization I believe that there is still a place for general natural history and one of the great advantages of a Union such as ours is that it brings together naturalists of widely differing interests. My address has been rather overburdened with obscure Latin names; may I restore the balance by listing the good Yorkshire names of the tetrads where I have carried out my fieldwork? Not 44/20 A,B,C,D, . . . but Langsett, Ecklands, Ingbirchworth Moor, High Flats, Upper Cumberworth, Brock Holes, Thurlstone, Scout Dike, Upper Denby, Denby Dale, Sheephouse, Penistone, Cat Hill, Gunthwaite, Bagden Hall, Black Moor, Four-Lane-End, Hoyland Swaine, Clough Green, Cannon Hall, Thurgoland, Berry Moor, Silkstone, Banks Hall and Cawthorne Park. Long may such country remain for our study and enjoyment, while as environmentalists we press on toward our goal of air fit for lichens, water fit for trout and a land fit for molluscs to live in.

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Through the Badger Gate by **E. Jane Ratcliffe.** Pp. 118, with 66 black and white photographs. G. Bell and Sons Ltd., 1974. £2.80.

Mrs. Ratcliffe is a badger enthusiast and a crusader for this most attractive of animals. This book covers her interest from the standpoints of field observer, badger keeper and protectionist. In the latter category her achievements in harnessing public concern, particularly through the inspired course of enlisting the support of the Women's Institute nationally, and in later time by involving herself in the passage of the Badgers Act (1973) into the statute book represent a great personal triumph. With half a million voters in its favour from the Federation of Women's Institutes the badger was well served by Mrs. Ratcliffe.

She has served naturalists well too by producing this book. Her field observations are meticulous and her narrative accounts of badger-watching sessions convey her deep involvement and excitement in a way which few could match. The albino badger which rewarded her efforts at one sett was a fitting climax to the long periods of perseverence which she and her husband put into their studies. His photographs incidentally, make a most apt accompaniment to her text.

Badger orphans helped the author almost as much as she helped them. Miss Bodger emerges as a lively bridge between the worlds of badgers and people and deserves to be as well known as any of the animals who, by their individuality, play an evangelical role in inter-specific relations.

Badger fencing and badger gates are now part of the planning provision available to motorway builders, thanks to the activities of the indefatigable Mrs. Ratcliffe. This book, too, should be required reading in conservation circles, private and public.

T.M.C.

THE HARVEST MOUSE IN YORKSHIRE

R. F. DICKENS

There can be no reason at all to doubt that the paper presented by C. A. Howes under this title in *The Naturalist*, no. 926, 81-84; 1973 gives an accurate account of the confirmed and published reports of the Harvest Mouse, *Micromys minutus* (Pallas). It would appear, however, that the "doubt on the continued existence of the Harvest Mouse in Yorkshire" is a result not so much of the animal's absence, as of the difficulty in finding and observing it in the first instance; and secondly, of the failure of those who have come across it (probably in many instances casual and non-aligned observers) to get the necessary confirmation of their findings or to pass on their observations to the appropriate recorders. In view of the paucity of records and in the hope of stimulating further investigation, it is perhaps worth-while detailing the following three reports. They may possibly indicate an extension of the range of the Harvest Mouse and obviously any changes need the fullest documentation.

1. Early in March, 1974, a farmer from Ledsham informed me casually in conversation, that whilst moving bales from a stack he had disturbed a mouse which his son trod on and killed. He immediately recognised it as some species he had not seen before, though he was quite familiar with Field Mice, *Apodemus sylvaticus* (Linnaeus); Shrew, *Sorex araneus* (Linnaeus) etc. He had gone to the trouble of consulting books in order to identify the animal. On discovering that it was a Harvest Mouse and reputedly extremely rare in our area, he had left some remaining bales confident that there would be other Harvest Mice among them.

Unfortunately it was some fortnight or so after he had obtained this specimen before I heard of it and although it had lain on a window ledge for a week or ten days after being killed it had been disposed of by this time.

Dr. J. D. Pickup, together with his son Charles who had recently returned from 2½ years studying small mammals in Ghana, visited the site where they put out a number of catch-alive Longworth traps between 25th and 30th March, but they were unsuccessful in capturing anything other than House Mice, *Mus musculus* (Linnaeus). On reflection it seems possible that because of the animal's predilection for moving up and down vertical stems, the Longworth may not be the most effective means of obtaining specimens.

Following our discussions with the farmer, Dr. and Charles Pickup and I were all confident that his identification had been a correct one. Even so, it was pleasing to receive other evidence. In a sample of eight pellets of Barn Owl collected at this farm there were remains of no fewer than four Harvest Mice. A further nine pellets collected from another site about 1½ miles away at Ledston also contained remains of two Harvest Mice. I am grateful to Colin Howes for information on the analysis of these two batches of pellets.

2. On 5th May, 1974, C. W. Winn, T. Boyer and B. Higgins, three of the Fairburn Ings Nature Reserve Wardens, together with the brother and young son of the last named were sitting on an embankment at Birkin watching birds, when the boy drew the attention of the adults to a mouse which was moving through the grass near their feet. They were able to pick it up and examine it in the hand at leisure. None of them had seen an animal like this before, but Mr. Winn had been in on the discussions about the Ledsham occurrence, had subsequently studied literature and illustrations and immediately recognised the Birkin animal as a Harvest Mouse. The others were equally satisfied as to its identity. It was released in the grass but instead of running off, proceeded to climb up the back of Mr. Winn's anorak. It was then taken and released some yards away from where they were sitting.

3. On resuming school on 2nd September, 1974, I was informed by a colleague, Mr. Peter Hall of Thorpe Audlin, that he had in his possession a Harvest Mouse which he had picked up on the road near his home. After dark, late on a rainy evening on Sunday 25th August, he was exercising his dog when he saw it in the road nuzzling a small creature which, in the dim street-lighting, he took to be a small toad. As a result of the creature's wet state and feeble efforts to escape — a lolloping, jumping movement rather than running — he was able to pick it up and take it home. It was very weak and bedraggled and he decided to keep

it in the hope that it would recover. It was at first fed on dried milk and baby cereal moistened with warm milk and later on grain and apple cores. With the aid of books he had identified it as a Harvest Mouse.

On 3rd September he confounded my scepticism by bringing the Harvest Mouse to school in a cage. By this time it was in comparatively good condition but when moving along a horizontal surface *appeared* to have some weakness of the hind limbs. Perhaps these are less well developed than the fore limbs which are the ones most used for clinging to and climbing upright stems, especially as the tail is also used as a prehensile "limb". In this latter kind of movement there certainly was no apparent impediment. Less ready progress along the ground might also explain the comparative ease with which the first of these Harvest Mice was stepped on and the other two caught.

This third creature was seen by Dr. Pickup and his son Charles, on the first day I had it and during the next week by members of the Castleford and District Naturalists' Society at one of their meetings and by the Ledsham farmer mentioned earlier. A series of colour transparencies was taken, but owing to the mouse's quick movement and its habit of hiding itself, this proved to be no easy task. It was handed over to Colin Howes on the 11th September when he took it to Doncaster Museum for photography and subsequent release at Thorpe Audlin where it had been found three weeks earlier.

In view of the current survey into the distribution of the Harvest Mouse it may be as well to include the following notes compiled by the survey organiser for guidance in recording the species.

How to record Harvest Mice

The most obvious signs of the presence of Harvest Mice are the characteristic breeding nests (which are illustrated in most books on British mammals). Finding these nests requires a lot less effort than trapping the mice themselves, especially since Harvest Mice often prove difficult to catch. The other advantage of looking for nests is that a large number of sites can be found in a single day. Therefore all the following instructions apply to looking for these nests.

1. When to look for nests: These are most easily found from early autumn and then throughout the winter until the spring, when any surviving nests are destroyed by new growth from the supporting plants. How long the nests persist depends on the weather and the type of habitat — in tall reeds they are soon battered down and destroyed by autumnal winds and rain, whereas in shorter grasses they usually persist until late spring, although frost and snow tend to flatten the nests somewhat and hasten their destruction.

2. Where to look: Harvest Mice are found in all areas of tall monocotyledonous plants, i.e. all areas of grassland, reeds, sedges, cereals, etc. Suitable habitats include farmland, hedgerows, roadside verges, young conifer plantations, bogs, marshes, salt marshes, brambles, scrubland, etc.

3. Characteristic features of the nest: The nest is built of the leaves of monocotyledonous plants, shredded longitudinally into strips 1-2mm. wide. These strips remain joined at the top and bottom of the leaf, are then woven together to form the framework and leaves of dicotyledonous plants may also be bound into the wall of the nest. The leaves that are used to build the nest are left attached to the plant, so that they support the nest. Unlike the nests of birds (e.g. reed warblers) the stems of the supporting plants do not pass through the nest, but surround it so that it hangs between the stems. The nest is lined by finely shredded grass or thistle down. While in use there is no obvious entrance to the nest, the mouse forcing its way through the wall and closing the hole afterwards. However when abandoned the exit hole is often left open so that a conspicuous hole may be seen.

4. Height of nests above ground level: This depends basically on the height of the supporting plants. In monocotyledons with leaves all the way up the flowering stem (such as cereals, *Phalaris*, reeds) the nests occur about halfway up the stems. But if the supporting plant forms tussocks of leaves at the base of the flowering stems (cock's-foot, *Deschampsia caespitosa*, *Molinia*) the nest usually sits on top of the tussock between the flowering stems, or sometimes under the overhanging leaves of the tussock.

5. SIZE OF NESTS: These vary in size from golf-ball size to cricket-ball size. The larger nests are used for breeding and are of a more solid construction.

6. WHAT DO THE MICE DO IN THE WINTER?: During the winter Harvest Mice are much more terrestrial, overwintering in the base of grass tussocks, in outbuildings, in walls, in stacks of bales, etc., and may even live in short tunnels just under the ground. Winter nests may be found in any of these sites and these can be told from other rodent nests by their smaller size, more compact form and by the shredding of the grass leaves, although this shredding is far less extensive than in the summer nests. Finding overwintering colonies is usually much harder than looking for summer nests once these have been abandoned for the winter.

7. FURTHER INFORMATION: There is no book readily available with an accurate account about Harvest Mice, and most are very misleading, especially when they describe the Harvest Mouse as "rare" or "nowhere common". Both these statements are wrong. However useful photographs of nests can be seen in: Lawrence, M. J. and R. W. Brown: 1967: *Mammals of Britain: Their Tracks, Trails and Signs:* London: Blandford Press. A more useful book with regard to field signs is: Bang, P. and P. Dahlstrom: 1974: *Collins Guide to Animal Tracks and Signs:* London: Collins.

Further information about the Harvest Mouse Survey, data sheets, etc., can be obtained from: Stephen Harris, Department of Zoology, Royal Holloway College, "Alderhust", Bakeham Lane, Englefield Green, Surrey, TW20 9TY.

OCCURRENCES OF THE WHITE-BILLED DIVER IN YORKSHIRE

JOHN R. MATHER

For several years it has not been possible to evaluate records of the White-billed Diver *Gavia adamsii* in Britain. Lack of knowledge of the distinction between this species and the Great Northern Diver *G. immer* in winter or sub-adult plumage has led to a reluctance to accept sight records and even to identify dead specimens. In this climate of uncertainty the *British Birds* Rarities Committee has wisely declined to adjudicate on all but the most obvious records in recent years. However, the problems of identification have recently been solved and the status of the species in Britain has finally been clarified and brought up to date. As nine of the 39 accepted British records have occurred on the Yorkshire coast, it is desirable that the status of the species in the county be reviewed.

SUMMARY OF RECORDS

The first Yorkshire reference is in John Cordeaux's *List of British Birds for the Humber District* concerning a bird shot at Filey Brigg in January 1897 and seen by Cordeaux in the shop of Brown, the local taxidermist. Nelson (1908) merely reported the occurrence, Witherby *et al.* (1940) regarded the record as uncertain and Chislett (1952) defended it on the grounds that 'Cordeaux was an excellent naturalist and a careful recorder'. Bannerman (1959) accepted this defence. There have been many 'excellent naturalists' both in Cordeaux's time and since, who have made mistaken identifications and in the total absence of supporting details this record cannot logically be included in the list of British records. [See Bannerman (1959), Chislett (1952a), Cordeaux (1898), Nelson (1907), Witherby *et al.* (1940).]

Since then there have been nine valid records of *adamsii*, eight of which have occurred since 1952. These are detailed below.

Between 29th February and 2nd March 1916, W. J. Clarke watched a bird in Scarborough harbour at close range and noted all the salient features. The bird was assuming summer plumage and the published details leave no room for doubt in what is the only sight record for the county. This first record for Yorkshire was the fourth for Britain. [See Bannerman (1959), Chislett (1952a), Clarke (1916), Wallis (1952b).[

That 34 years should elapse before the next record is curious considering the average four yearly interval between the subsequent seven. This was an oiled bird found dead on Scarborough south beach on 30th January 1952 by Eric Sigston and sent to A. J. Wallis for identification. Unfortunately, because of the oiled state of the plumage, only the head was preserved. It has the most classic bill shape of any *adamsii* I have examined, a feature which the past literature has stressed too much, the majority having bills which are neither as straight along the culmen nor as angled at the gonys. The second Yorkshire and the eighth British record. [See Bannerman (1959), Chislett (1952a, 1952b), Wallis 1952b).]

The third example was found oiled and dying at Sandsend, near Whitby on 10th February 1952 and taken to A. B. Walker who arranged for it to be made into a cabinet skin for the Whitby Museum. This skin, prepared at the Hancock Musuem and sent to the British Museum for confirmation, has been lost but fortunately the bird was photographed before it died and the record is well documented (see page). It was an adult female assuming summer plumage and was the ninth British record. [See Bannerman (1959), Chislett (1952a, 1952b), Walker (1952).]

The fourth record for the county came from Hedon Haven on the upper Humber when a bird was found oiled and dying on 18th February 1953. The bird was an adult assuming summer plumage and was the thirteenth British record. [See Bannerman (1959), Fenton (1953).]

The fifth, again oiled and dying was found at Saltwick Nab, near Whitby on 17th March 1956 and taken to A. B. Walker. This was an adult assuming summer plumage and is preserved as a mount in the Whitby Museum. This was the seventeenth British record. [See Y.N.U. Orn. Rep. (1957).]

The next bird was the most controversial of all British records of *adamsii*. It was an adult female, found dead and oiled at Tunstall on 18th March 1962 by B. S. Pashby and preserved as a cabinet skin by A. H. Rider. It was submitted to the *British Birds* Rarities Committee for consideration, who in turn sought an independent opinion. After much correspondence, the bird was finally pronounced to be a Great Northern Diver though it is significant that no substantive reasons were given for reaching this decision. A note to this effect was published in *The Naturalist* (Pashby 1963). I saw the specimen at the autumn meeting of the Y.N.U. Ornithological Section in 1962 and was confident that it was in fact *adamsii*. This apparently erroneous identification by the authority of the time prompted me, in collaboration with David M. Burn, to research the two species, the results being published in *British Birds* (Burn and Mather 1974). This record has subsequently been accepted by the *British Birds* Rarities Committee as *G. adamsii* and becomes the 22nd British record and the sixth for Yorkshire. [See Pashby (1963), Y.N.U. Orn. Rep. (1963).]

The seventh bird was seen swimming close inshore at Robin Hood's Bay on 15th February 1966 by C. J. Feare. It was oiled and came ashore on the 16th when it died. The bird was an adult female assuming summer plumage and was sent to me for identification and preservation. This was the 26th British record. [see Y.N.U. Orn. Rep. (1969).]

The eighth Yorkshire example was found dead on Filey beach on 1st March 1969 by R. H. Appleby and sent to me for preservation. Again, this was an adult female assuming summer plumage and was heavily oiled on the breast. The 30th British record.

On 8th December 1973, a bird was picked up dead on Hornsea beach by R. R. Lowe and taken to D. T. Ireland, the R.S.P.B. warden at Hornsea Mere. The decomposing corpse was finally sent to me via Tony Taylor of the Newcastle University Seabird Research Unit, to whom it had been taken by D.T.I. and I skinned it on the 24th January 1974. It was in juvenile plumage and only the second such to be found in Britain. The bird was not oiled. This ninth record for the county was the 39th for Britain.

Apart from the references given above, details of all the Yorkshire birds appear in Burn and Mather (1974).

The two birds from the Whitby area (Sandsend and Saltwick Nab) were difficult to trace. Only one specimen exists, a mounted bird in the Whitby Museum which bears no date and is in poor condition, the plumage having been eaten by insects. The Sandsend bird has always been referred to as a 'skin' and the set of measurements published in *British Birds*

(1952) does not match that of the mounted bird at present in the museum. Both birds were sent away for preservation at their respective times of occurrence and the one now at the museum is known to have been returned about 1960 (B. Fewster *pers. comm.*). The evidence seems clear enough to justify relating the mount to the 1956 Saltwick Nab record and thereby substantiating it; otherwise the only available reference is a brief statement in the Y.N.U. Ornithological Report for 1956 that 'One was found in a moribund state at Whitby on 17th March'. It must be concluded that the skin of the first specimen (Sandsend) is now lost. If this occurrence had not been so well documented, it is feasible that both records would have been in doubt in the absence of a properly labelled and catalogued specimen. This is a good illustration of the need to publish all the details of any rare bird.

Descriptions

Details of five of the Yorkshire records have never been published (Whitby 1956, Tunstall 1962, Robin Hood's Bay 1966, Filey 1969 and Hornsea 1973). The first four birds were in a remarkably similar state of plumage. All were adults and apart from the Whitby bird, which was not sexed, all were females. They were in predominantly winter plumage with a few summer plumage feathers appearing on the mantle and scapulars. The moult of the wing coverts was well advanced except in the Tunstall bird which also had the least summer plumage feathering in the mantle and was considered to be in its second winter and so acquiring breeding plumage for the first time. The bills were similar in all four birds except for slight differences in overall dimensions, the colour being pale whitish-horn, shading to brown at the extreme bases of the upper and lower mandibles. The culmens were clear of any darkening — a diagnostic feature for the species.

The Hornsea bird was in juvenile plumage, the entire mantle and scapulars being pale greyish-brown in colour, each feather being broadly edged with greyish-white giving a markedly scalloped effect. The bill, though shorter than most adults was very deep with a well developed gonys angle. The colour was typically whitish-horn shading to brownish at the bases of both mandibles. The viscera were too decomposed for the sex to be determined.

Dates of Occurrence

All the above records have occurred between December and March and eight of these have been between 30th January and 18th March, the other being on 8th December. This latter bird was a juvenile whilst the rest were adults (2nd winter or older).

This temporal distribution is in accord with the theory that White-billed Divers reach British waters as a result of a continuation of their south-westerly, post-breeding migration along the Norwegian coast across the North Sea to hit the British coast between Yorkshire and south-east Scotland. The most likely time therefore to see *adamsii* on the Yorkshire coast is during February and March, after which they move northwards on their return journey to the breeding grounds.

Discussion

Although there are now 39 accepted British records, the White-billed Diver is still a rare bird, though not the 'vagrant' it was thought to be when *The Handbook* was published (1938-41). Sight records of live birds are scarce in Britain, only 15 out of the 39 so far recorded, the majority of these occurring in north-east Scotland and the Shetland Isles. The reason for this is not clear, especially as 'sea watching' from the north-east coast of England is a popular pursuit in winter and spring. Every large diver should be critically examined and any corpses, of either species, should be collected for preservation *whatever their condition*. It is always possible to preserve some part of even a rotting corpse.

I would welcome any such material for the continued study of these two closely allied species. The identification criteria of both live and dead birds are fully described in a recent paper 'The White-billed Diver in Britain' (Burn and Mather 1974). I do not propose to detail the contents of the paper here but strongly recommend that it be consulted by those birdwatchers who visit the coast in the winter months. It is possible that some records of *G. adamsii* have been overlooked in the past through lack of detailed knowledge and a

a largely false impression that it is a very difficult, if not virtually impossible species to separate from *G. immer*.

SUMMARY

The nine occurrences of *Gavia adamsii* in Yorkshire are detailed and their equivalent British record numbers given. All published references are cited. Brief descriptions are given for five birds whose details have not hitherto been published. Dates of occurrence are discussed and the most likely period for a Yorkshire record postulated (February and March).

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Moose Magic by **Miles Smeeton**. Pp. 191, with 11 black and white photographs and numerous line drawings. Collins and Harvill Press, 1974. £2.75.

This is the funniest natural history book I have read in years, certainly since *I'll Trade You an Elk* appeared. In this story of the creation of a private game park in the foothills of the Canadian Rockies, two moose, Petrushka and Peterkin, along with an elk (Wapiti for British readers — who reserve the name elk for what new-worlders call moose) called Prissy, mingled with the author and his family in hilarious goings-on.

Raising the original pair from foundlings and subsequently managing to breed from them is a considerable zoological achievement. Noting behaviour details beyond the range of field workers, not least the moose's position with regard to the lone elk, gives this book ethological significance. But what makes the book outstanding, for me at least, is the humour which pervades every chapter as man and moose meet, headlong at times.

A word about the illustrations; the drawings by P. F. Wright are wonderfully evocative of the shambling grace of the biggest deer in the world and make a perfect complement to the text.

T.M.C.

AN OBSERVATION ON THE FEEDING BEHAVIOUR OF THE MARSH TIT

T. S. CROSBY

On the afternoon of September 29th, 1974, while botanising in Birks Wood, Buckden, Wharfedale, my attention was drawn to occasional short bursts of repeated tapping noises. The sound was somewhat akin to the drumming of a woodpecker heard from a considerable distance but the repetition of the taps within each burst was noticeably less rapid. Lifting my head while listening I noticed a small bird fly across the path in front of me and alight on a small branch of Bird Cherry; it proved to be a Marsh Tit *(Parus palustris* L.*)*. On arrival at the branch it had a red berry in its beak which it proceeded to wedge in a small fork of the branch. It then withdrew what was apparently the seed and retreated a few inches down the branch. The seed was then wedged between its feet on the branch and subjected to repeated attack by the bird's beak and this proved to be the source of the mysterious tapping which had just caught my attention. The short burst of pecking over, the seed was allowed to fall to the ground and the bird flew off to a nearby Yew. Having secured a ripe Yew berry it then flew on to a neighbouring Hazel and repeated the process. A subsequent examination of the fleshy remains of the first berry where it was stuck to the fork of the Bird Cherry proved that also to be a berry of Yew.

The activity was repeated several times before the bird flew further away and was lost to sight. In each case it used a different perch to separate the seed from the aril. It was never observed to extract seed from aril at the point of collection of the berry on the Yew tree; it always flew elsewhere for this operation. On one occasion the viscous mucilaginous threads stretching from seed to aril as the seed was withdrawn could be clearly seen glinting in the sunlight with the aid of binoculars. The seed was apparently held in the beak through the open end of the aril when removing the berry from the fruiting twig and the viscous clinging nature of the aril was presumably the reason for wedging this in the fork of a branch so that the seed could be more easily separated. Careful examination of the peripheral branches of surrounding trees by means of binoculars revealed ripe Yew arils stuck to many of them, including those of Sycamore, Mountain Ash and the Yew itself although in this latter case the arils were apparently always stuck to fissures in the bark of the bare branches a little further inside the tree from the fruit-bearing leafy twigs.

On examining the ground beneath the Yew a considerable number of empty arils were found, by far the largest proportion being underripe and still green; some of these were already rotting and moulding. Presumably the activity described above had been going on for some days and had started while the berries were all still green. Since the green arils were not nearly so sticky these could probably be more easily separated from the seed and would fall freely to the ground rather than stick to branches. Among the separated arils on the ground were numerous empty seed shells, occasional ones neatly split in half but the great majority with a hole chipped from the side just sufficiently large to allow the kernel to be extracted.

The bouts of tapping were heard on further occasions in the same wood that afternoon and again the following morning but I was not again lucky enough to observe the bird responsible and so cannot say for sure whether the habit was confined to the Marsh Tit or was also shared by the other species of tit in the wood. Numerous Blue Tits and Great Tits and one Coal Tit were seen feeding in the wood at about the time of the above observations and later on a small party of Long-tailed Tits were also noted but none of these was observed to take a Yew berry, their diet apparently being confined during observation to insects and other small animals.

The only specific records I have found of tits taking Yew berries are those of Great Tit (Witherby *et al.*, 1938) and Coal Tit (Bannerman, 1953) but other birds known to take Yew berries include Nuthatch (Bannerman, l.c.), Greenfinch (Newton, 1972), Song Thrush and Missel Thrush (Simms, 1971). The latter author also mentions the Goldcrest as being "associated with Yews" in mixed broad-leaved woods and also with Yew scrub on the downs. He also quotes an R.S.P.B. survey which showed that the berries most frequently taken by

birds were Elder, Hawthorn, Yew and Holly. Both Nuthatch and Goldcrest were observed feeding in the area at the time of my observations on the Marsh Tit but only the Goldcrest was seen on the Yews at the time and that was not seen to take berries.

While I have so far found no record of an identical activity to that I have described above some similar activities are perhaps worthy of comparison. Coward (1933), in describing the vegetable portion of the diet of the Great Tit, writes "acorns, beech mast, birch seeds and various nuts are carried to a convenient perch, where, holding them with one foot, the bird hacks out the contents." The same author also related that "when maize is provided for the Pheasants the Marsh Tit comes for a share; it carries a grain to a branch, holds it firmly and picks out the 'eye', drops the rest and flies down for another." Bannerman (l.c.), describing the nest-boring activities of the Willow Tit, writes "the next day it could almost get into the hole and frequently got out larger chips and *these it invariably took to branches of neighbouring trees and broke up in its bill*, letting the pieces fall almost in the form of dust. It also frequently put pieces on the bough, often between its feet, and pecked at them." (The italics are those of Bannerman.) While this author also records the Nuthatch as eating seeds of Yew there is no indication of how this is accomplished, although this species is known to tackle hazel nuts by wedging them firmly in a crevice and "hacking them open with the sledgehammer blows of its powerful little bill."

There are therefore records of tits using their feet as extra tools and also of their flying off to another perch rather than carrying out the pertinent activity on the spot or close-by. I have not however found any previous record of the Woodpecker-like sound resulting from the activities I have described or of the use of a forked branch as a means of gripping an object.

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A Gardener's Progress by **Gwladys Tonge.** Pp. 127 with 11 illustrations. Faber & Faber, 1974. £2.75.

Kamuti — A New Way in Bonsai by **Willi E. Bollmann.** Pp. 106 with 2 colour and 12 monochrome plates and 33 figures. Faber & Faber, 1974. £3.50.

Gwladys Tonge's book describes her experiences as a gardener from sowing her first packet of Woolworth's seed through to the making of her fourth garden. It is an ideal introduction to gardening for those who would dearly like to garden but have not got the courage to start or who have been discouraged by their first efforts. Mrs. Tonge teaches from her experience, encouraging the reader to try for himself and to regard his failures as stepping stones of experience on the way to success. The book is admirably written with a quiet humour and one's only regret is that its cost could deter some potential readers. A paper-back edition might have reached the much wider readership it deserves.

Bollmann's book expounds the author's own particular techniques for the production of dwarf trees for display. He is clearly biased when comparing these with those of traditional bonsai, the most startling example being on p. 101 where he claims a reduction of 1/400 in leaf size vs. 1/10 for traditional techniques. Even allowing for a misprint (he mentions 1/100 elsewhere) his claims are clearly preposterous — they would require the reduction of say a horse-chestnut leaf to about 1/10 of an inch! However the beginner would find the book easy to follow and the method should lead to satisfactory results. Whether he would find the book good value at £3.50 for about 50 pages of somewhat repetitive text is another matter, even allowing for a similar quantity of illustrations.

T.S.C.

THE MACROFUNGAL FLORA OF TWO NATURAL OAKWOODS IN CUMBERLAND

T. F. HERING

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Birkrigg Oaks (NY 215205) and Keskadale Oaks (NY 207195) are two patches of natural oakwood which occur high up on the side of the Newlands Valley in the English Lake District. They were described at length by Leach (1925) and a condensed description appears in Tansley (1939). There is no previous record concerning the higher fungi of these woodlands and the present paper is based on nine visits made in late summer and autumn between 1964 and 1973.

The pattern of higher plants composing the woodlands has changed little since Leach's time. Both consist almost entirely of Sessile Oak *(Quercus petraea)*; the only other accompanying tree is Rowan *(Sorbus aucuparia)* in small numbers. Near the west end of Birkrigg are a single pine *(Pinus sylvestris)* and one larch *(Larix decidua)*. Although now well-grown, these may well have been seedlings in 1925, for Leach does not mention them. The oaks, most of which have multiple trunks, are undoubtedly very old, and annual growth increment must be very small. The overall height of the trees is only 4-5 m, with some taller examples (8-9 m) in the sheltered part of Keskadale.

Both woodlands are devoid of any shrub layer and the ground flora is poor in species, but slightly different at the two sites. At Birkrigg the slope is moderately steep (30° according to Leach) and is trodden into many sheep-paths. The predominant plant is Bilberry *(Vaccinium myrtillus)*, growing from turf which is partly composed of grasses *(Festuca ovina, Anthoxanthum odoratum* and *Deschampsia flexuosa)* and partly of mosses (mainly *Pleurozium schreberi*). The soil, overlying slate, is very thin and stony, and at its west end the wood is split into strips by scree from the mountain above. At Keskadale the slope is steeper (some 40°) and the woodland floor is broken into steps by moss cushions made up mainly of *P. schreberi, Dicranum majus* and *Polytrichum formosum*. The soil beneath these cushions is highly organic and usually deeper than at Birkrigg. Leaf litter occupies the tops of these cushions, while at Birkrigg there is no visible leaf litter. Bracken *(Pteridium aquilinum)* is scattered through both woodlands and there is some heather *(Calluna vulgaris)* though apparently less than in Leach's time.

These woodlands stand at an altitude probably unequalled by any other natural woodland in the British Isles (Birkrigg 350-425 m; Keskadale 305-460 m) and undoubtedly present extreme conditions for the oakwood community. For this reason, and because oakwoods of such high purity are very uncommon, it was considered worth while to obtain a list of the higher fungi (Table 1) and to compare it with the flora of macrofungi published by Hering (1966) for two mixed oakwoods at much lower altitudes on similar if somewhat deeper soils.

Both woodlands were visited on nine occasions (dates are given in Table 1) when a rectangular walk was taken inside each wood and notes made of all fruit-bodies growing on the ground. All parts of each wood were included, except the south-western end of Keskadale which was uncomfortably steep and rocky and almost barren of higher fungi. This method of sampling was made necessary by the fact that fruit-bodies were in general very scarce; quadrats of 100 m^2, as used by Hering (1966), would have been too small to yield even one fruit-body on some visits. But the list of species obtained was surprisingly rich; 45 species of Basidiomycetes at Birkrigg and 59 and Keskadale, of which 38 were common to both sites. These lists can scarcely be complete. Table 1 indicates that many of them were only found fruiting on one occasion and no doubt other species are present that have not yet been recognised by their fruit-bodies. In Table 1 are indicated those species considered to be relatively abundant on one or more visits. The criterion used here is the presence of the fungus at ten or more locations in one wood.

If toadstools in general were scarce, compared with their numbers in low-level woodlands, this was particularly true of the small decomposer species. *Mycena galopus*, usually the most

Table 1

Occurrence of macrofungi at Birkrigg and Keskadale Oaks.
Dates of visits: (1) 14 Aug. 1964 (2) 12 Sept. 1964 (3) 21 Sept. 1967 (4) 10 Aug. 1968 (5) 12 Sept. 1970 (6) 13 Aug. 1971 (7) 15 Oct. 1971 (8) 27 July 1973 (9) 22 Sept. 1973.
The figures indicate the number of visits on which each species was found (first figure — Birkrigg; second figure — Keskadale). * indicates abundant species, as defined in text. p = present.

Ascomycetes	
Elaphomyces granulatus Fr.	0/1*
Cordyceps ophioglossoides (Ehrenb.) Link	0/1*
Phragmobasidiomycetes	
Exidia glandulosa (Bull.) Fr.	1/0
Dacrymycetales	
Dacrymyces 'deliquescens'	1/0
Aphyllophorales	
Cantharellus cibarius Fr.	0/3
C. cinereus (Pers.) Fr.	1/1
Stereum hirsutum (Willd.) Fr.	3/0
S. rugosum (Pers.) Fr.	2/1
Clavulina cristata (Fr.) Schroet.	1/0
Hydnum repandum (Linn.) Fr.	2/2
Phellinus ferreus (Pers.) Bourd. and Galz.	p/p
Agaricales	
Boletus chrysenteron St. Amans	0/1
B. edulis Fr.	2/1
B. subtomentosus Fr.	1/2
Porphyrellus pseudoscaber E. J. Gilbert	0/1
Suillus grevillei (Klotzsch) Sing.	1/0
Paxillus involutus (Fr.) Fr.	1/0
Collybia dryophila (Fr.) Kummer	0/4*
C. maculata (Fr.) Kummer	0/1
C. peronata (Fr.) Kummer	0/4
Laccaria amethystea (Merat) Murrill	0/1
L. laccata (Fr.) Cooke	2*/3
Marasmius androsaceus (Fr.) Fr.	2/1
Mycena galericulata (Fr.) S. F. Gray	1/2
M. galopus (Fr.) Kummer	2/3
M. sanguinolenta (Fr.) Kummer	2/2
M. sepia J. Lange	0/3
Clitopilus prunulus (Fr.) Kummer	0/1
Nolanea cetrata (Fr.) Kummer	0/2
N. staurospora (Fr.) Kummer	2*/5*
Cortinarius anomalus (Fr.) Fr.	1/3*
C. pseudosalor J. Lange	3/2
C. sp. cf. *azureus*	0/1
C. sp. cf. *paleaceus*	1/0
Galerina hypnorum (Fr.) Kühn.	1/5
G. mycenopsis (Fr.) Kühn.	1/2
Agaricales *(continued)*	
Inocybe bongardii (Weinm.) Quel.	0/2
I. cookei Bres.	1/1
I. hystrix (Fr.) Karst.	1/1
I. lacera (Fr.) Kummer	1/0
I. umbrina Bres.	1/3
Rozites caperatus (Fr.) Karst.	0/1
Hypholoma fasciculare (Fr.) Kummer	0/3*
Psilocybe semilanceata (Secr.) Kummer	0/1
Stropharia semiglobata (Fr.) Quel.	1/3*
Panaeolus sp.	1/0
Psathyrella squamosa (Karst.) Moser	1/3*
Amanita rubescens (Fr.) S. F. Gray	4/6*
Cystoderma amianthinum (Fr.) Fayod	0/3
Pluteus cervinus (Fr.) Kummer	0/3
Lactarius camphoratus (Fr.) Fr.	4/3*
L. quietus (Fr.) Fr.	4*/5*
L. vellereus (Fr.) Fr.	2/3
L. volemus (Fr.) Fr.	0/2
Russula atropurpurea (Krombh.) Britz.	4*/8*
R. cyanoxantha (Secr.) Fr.	4*/8*
R. delica Fr.	0/1
R. emeticella (Sing.) Hora	5*/6*
R. foetens (Fr.) Fr.	3/3
R. fragilis (Fr.) Fr.	1/2
R. lepida Fr.	1/1
R. lutea (Fr.) S. F. Gray	1/1
R. nigricans (Merat) Fr.	5*/3
R. ochroleuca (Secr.) Fr.	1/1
R. romellii Maire	0/1
R. rosea Quel.	2/3
R. vesca Fr.	2/2
R. xerampelina (Secr.) Fr.	0/2
Gasteromycetes	
Lycoperdon foetidum Bon.	2/1
Scleroderma citrinum Pers.	2/3

constant small toadstool in Lake District woodlands, could only be found on three occasions and then in very small quantity. *Collybia peronata* was restricted to one location in Keskadale, where it was found in three separate years. It is not only the severe climate that restricts the fruiting of these species. There is also the fact that much of the leaf litter blows away down the steep slope, leaving relatively little to decompose on the woodland floor.

Reputedly mycorrhizal fungi, such as *Russula* spp., were much more regularly found. No authoritative list of the mycorrhizal fungi of oak is yet available. But oak is the only known mycorrhiza-former among the higher plants present. If one follows Singer's (1964) list of potential mycorrhiza-forming fungi, it appears that we have here more than thirty mycorrhiza-formers, presumably all associated with oak. These are mainly species of *Russula*, *Lactarius*, *Cortinarius* and *Inocybe*, with the addition of the facultative mycorrhiza-formers *Paxillus involutus* and *Laccaria* spp. This rich flora may reflect the fact that this is an old-established natural community and has been open to undisturbed fungal colonisation for a very long time.

On the evidence of frequency and abundance, the major apparently mycorrhizal species are similar to those of low-level woodlands: *Russula atropurpurea*, *R. cyanoxantha*, *R. emeticella* and *Lactarius quietus*. There are also some differences. *Lactarius tabidus*, the commonest member of its genus in the low-level woodlands, was absent. *Russula ochroleuca*, common at low altitudes, was recorded on only one visit. *Laccaria amethystea* was unrecorded here until a single fruit-body was found at visit 8; it is fairly common in the low-level woodlands. It is so far impossible to say whether these differences are truly associated with altitude and climate, or are due to the absence of some companion species such as birch. The most unexpected find was *Porphyrellus pseudoscaber*, usually reckoned an uncommon toadstool, but found as a group of about ten specimens on one occasion at Keskadale.

Fungi growing on trees and logs were not systematically sampled. Although the trees carry a lot of dead wood, there were few wood-rotting macrofungi — only *Phellinus ferreus* and two *Stereum* species were noted on branches, and *Exidia glandulosa* on fallen wood, as well as some unidentified resupinate species. Of the larger Ascomycetes, only two were found. One was *Cordyceps ophioglossoides*, in considerable quantity at Keskadale at visit 3. This fungus is a mycoparasite, and its presence led to the discovery of the second Ascomycete, its subterranean host *Elaphomyces granulatus*; no digging for this species was done at other visits. Fungi associated with the Birkrigg pine tree were not found, but *Suillus grevillei* was present with the larch. The woodland fungi were totally absent from the hillsides outside the tree-covered area, apart from the grassland fungi *Psilocybe semilanceata* and *Panaeolus* sp., and the coprophilous *Stropharia semiglobata*.

These observations show that under severe mountainside conditions few fruit-bodies are produced. It has taken some time to assemble the present list of about 70 species for the two woodlands, but it seems that the macrofungal flora is not an impoverished one, as most of the species known from low altitudes are encountered here. Although it has been reported from the Alps (Favre, 1955) that mountain conditions lead to abnormally small fruit-bodies, this was not noticed here, and some of the specimens of *Boletus edulis* were exceptionally large.

I am indebted to Dr. D. A. Reid of Kew Gardens for the identification of some specimens.

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JUNCUS TRIGLUMIS IN WENSLEYDALE

W. A. SLEDGE

During the excursion of the Botanical Section of the Y.N.U. to Cotterdale on 14th July 1974, Mr. D. R. Grant found a few plants of *Juncus triglumis* in a calcareous flush high up the dale at approximately 1,500ft. O.D. This discovery is of great interest since an element of doubt surrounds all three of the Yorkshire stations from which this species has previously been recorded.

In Baker's *North Yorkshire* (1863) the entry for it reads: "Alien. Said to have been planted on Cronkley Fell by the miner John Binks." That it was indeed introduced there by Binks was confirmed 40 years ago by G. W. Temperley in a note (*Nat.* 1934, 180) wherein he refers to an old interleaved and annotated copy of *The Botanists' Guide through the Counties of Northumberland and Durham* (1805) by N. J. Winch and others, once the property of William Robertson of Newcastle who died in 1840. Robertson's annotation reads: "J. Binks brought three plants of this from Meldon Fell (where he first discovered it) and planted them by a stream near the Black Arc on Cronkley, Yorks. Two plants were in fructification when he pointed them out to me in August 1814. W.R."

Temperley's note goes on to say that from this small beginning the plant has spread until it is now to be found in many places about the streamlets on the eastern and western edges of the sugar limestone plateau of Cronkley Fell. This may be the case but the matter well illustrates the consequences of such deliberate introductions, for no one can now claim with certainty whether the present population of *J. triglumis* is wholly derived from the three specimens originally planted there, or whether, as is not unlikely, the plant already existed, undetected, in some other bog on Cronkley before Binks introduced it there.

In the *Supplement to the Yorkshire Floras* (1941) two other stations are quoted on the authority of Dr. F. A. Lees, viz. on Dodd Fell (34/88) and Whernside (34/78). These are included in the *Atlas of the British Flora* (1962) as unconfirmed, pre-1930 records. They appeared originally in a chapter by Lees on "Wensleydale's Wild Flowers" in Edmund Bogg's *The Green Dale of Wensley: a Yorkshire Arcady* (1909) and are repeated in Lees' *Vegetation of Craven in Wharfedale* reprinted from *The North-Western Naturalist* (1937-1939). From Dodd Fell Lees also recorded, in the first quoted article, *Thalictrum alpinum* and *Salix herbacea* and in the second work he added *Carex capillaris* though he omitted the *Salix* and *T. alpinum* both from this and his *Supplement*, despite the fact that in the first he claimed to have "confirmed the Fothergillian record for the Alpine Rue *(Thalictrum alpinum)*."

I drew attention to these records in the Y.N.U. Circular (No. 396) issued for the Whitsuntide meeting held at Hawes in 1936 and the late C. A. Cheetham and I searched the upper part of Dodd Fell with these plants in mind. Though the time of our visit (30th May) was too early for any of these plants to be in flower we could not even locate "the wet, barren, chert stony shoulder . . . nigh the summit. There the limestone has undergone some change or decomposition, and a peculiar sparse flora characterises the flinty-strewn and black merly *(sic)* soil," as described by Lees (1909) for the habitat of the Dodd Fell species. All these plants are so very rare throughout Yorkshire that one would have expected confirmatory specimens to be present in Lees' herbaria; but I am informed by Miss M. B. Gerrans (British Museum —Natural History) and Miss M. M. Hartley (Cliffe Castle, Keighley), to whom my thanks are due for making the search, that no Dodd Fell specimens of any one of them exist in his collections nor is there any specimen of the *Juncus* from Whernside. The topographical importance of the records is so great (and no one would be more aware of this than Lees himself) that it is difficult to reconcile them with the absence of any confirmatory evidence.

I have visited Dodd Fell more than once since the occasion referred to above though I make no claim to have repeated the search for these plants. The area is extensive and it might repay further searching. But I regard Mr. Grant's discovery as the most unequivocal record yet made for the occurrence of *Juncus triglumis* as a truly indigenous Yorkshire species.

FIELD NOTES

Rediscovery of *Orobanche alba* in Ribblesdale

On June 22, 1974, Mrs. Elizabeth Shorrock of Settle discovered a fine colony of *Orobanche alba* Steph. on limestone in the Ribble valley near Settle. I visited the spot a few days later and found at least 20 spikes coming up with just a few flowers open. As far as I can ascertain this is the third record for this plant in the Ribble valley. The first, a single specimen only, was made by Dr. John Windsor (author of *Flora Cravoniensis*) in 1811 and maybe near the present site. The second was by J. Hardy, of Hulme, Manchester, in September 1854 and recorded in *The Phytologist*, New Series, **1**, 518, 1856, "among straggling bushes of *Prunus spinosa* about a mile from Settle."

In the circumstances, and in view of the fact that a full account of the history and Yorkshire distribution of *O. alba* was published by Dr. J. D. Lovis in *The Naturalist* 1969, 37-42, following the 1968 Wensleydale rediscovery, little more need be said about the Ribblesdale colony. Unfortunately, some of the plants were later broken off by sheep, but as the plant is perennial, and *Thymus drucei* is abundant in this particular spot the continuance of the colony seems assured.

Hardy's herbarium and Windsor's Settle plants are both incorporated in the Manchester Museum herbarium but enquiry has revealed that neither contain specimens of *O. alba* from the Settle locality.

J. N. Frankland

The Monkey Orchid in Yorkshire

A single well-developed plant of *Orchis simia* L. (Monkey Orchid) with one fine flowering spike and two non-flowering shoots was found in the East Riding of Yorkshire by Mrs. A. Fritchley on May 26th, 1974. In the circumstances it is considered unwise to publish any details concerning the locality and those who know of the whereabouts of the plant are earnestly requested to give it every chance to survive and reproduce, by not drawing further attention to it.

The appearance of the Monkey Orchid in Yorkshire is remarkable on account of its extreme rareness in the British Isles and the fact that it has never previously been recorded north of the Thames valley. At the present time there are only three known colonies in the south of England, two in Oxfordshire and one in Kent. The species was also formerly recorded for Berkshire, Surrey and Sussex. Until about 1835, it was locally plentiful on both sides of the Thames where the river cuts through the chalk hills of the Chilterns, but became rare in this area in a comparatively short space of time as a result of more intensive farming and the spread of towns.

An attempt was made to artifically pollinate the East Riding plant as it was known that a colony of twenty plants in Kent had been increased more than ten fold by this and other conservation measures. The plant bore at least nine mature fruits which dehisced and spread their seed.

This discovery of Monkey Orchid in the East Riding is of great interest and recalls the occurrence of a single plant of *Himantoglossum hircinum* L. Spreng (Lizard Orchid) in the Pickering district in 1939. An account of the history of the Lizard Orchid in the British Isles by Dr. Sledge appeared in *The Naturalist*, 1939; 309-10. In the latter half of the nineteenth century the Lizard Orchid had become very rare and was thought to be on the verge of extinction. A remarkable change occurred in the early part of the present century: not only was it found more frequently in south-east England, but it turned up in a number of counties beyond the earlier limits of its distribution. During this period as many as two hundred plants were found in some localities, though most occurrences consisted of solitary plants. This remarkable spread of the Lizard Orchid was attributed to a shift of climate to a more oceanic type; between 1900 and 1933, the winters were slightly warmer and wetter, with

fewer severe frosts in spring, whilst the summers were very slightly cooler and drier. The Monkey and Lizard Orchids have similar distributions in south and central Europe and the ability of Monkey Orchid to flower in Yorkshire this year may possibly reflect a change to a more equable climate in recent years. Will the Yorkshire plant appear again and is this new locality the first of more to come? The answer to such questions will be awaited with great interest.

Eva Crackles

Those who watched the television documentary on "The Weather Machine" or read the account of meteorological and other evidence which it surveyed in the course of examining the probability that we are heading for another Ice Age, may recall that the period 1930-40 was cited as the time when summers in this country were warmer on average than at any other time during this century. It may not be without significance therefore that the deterioration in temperatures since then has been accompanied by an equally dramatic *decrease* in the number of stations for the Lizard Orchid from a peak of more than 130 localities in 66, 10km. squares up to 1940, to 12 localities in the 1950's and 9 stations now. — Ed.

Ross's Gull *(Rhodostethia rosea)* in Yorkshire

On Sunday, 27th January, 1974, my wife and I were watching birds in the harbour area of Bridlington, Yorkshire. It was a fine day, cold, with almost clear skies, plenty of sun and little wind. At about 14.30 we arrived at the north end of the north pier and almost immediately noticed a very small solitary gull on the sea, about 30 yards out from the pier. The immediate impression was of an immature Little Gull *(Larus minutus)*, as the bird was very small and showed the dark horizontal bar on the folded wing at rest. However, this possibility was soon ruled out as the bird showed no dark marks at all on head or neck. (This in fact ruled out all other gulls which came readily to mind.)

The bird was subsequently watched on the water for a period of approximately fifteen minutes, at a fairly constant range of about 30 yards, with the light on the bird, before it flew away. It was very lethargic and remained apart from the other gulls scattered around the area, which included Greater Black-backs, Common, Herring, many Black-headed and several Kittiwakes, including one immature. There was also a party of four Long-tailed Ducks nearby.

On a number of occasions Black-headed Gulls overflew the bird and several times settled on the water nearby for short periods, thus good opportunities were offered for direct comparisons of size and other features. The bird was markedly smaller than the Black-headed Gulls, about two-thirds the size, and different in silhouette. It sat lower in the water, with a shorter "bull-neck" appearance. The rather large-headed appearance we noted may have been due to this habit of sitting in a "no-neck" position. The bill was noticeably tiny, no more than one-third the width of the head, and the eye rather large. The head in addition to looking rather large, was noticeably rounded. The body was short and compact, with the wings protruding some distance beyond the tail and not held as high off the back as in Black-headed Gulls. The total impression was one of small size, compact shape and longish wings.

After a period of continuous observation during which time the bird had drifted into the harbour entrance, it was disturbed by a returning fishing boat. It took off and flew directly away from the observation point, towards and beyond the sewage outflow to the south, already frequented by many gulls of a variety of species. It was watched out of sight without settling.

The wings were proportionately long, but not particularly narrow, with pointed tips. The tail was lozenge (or wedge) shaped, white with narrow terminal band of black. A distinct three-triangle pattern on the upper spread wing was noted, with a dark bar across it. The flight was direct and Kittiwake-like.

Detailed Description

Head, neck, throat, breast and all underparts pure white. Wash of pale grey on nape in some lights. No dark marks on head or neck.

Rump and tail also white, tail lozenge-shaped, with narrow terminal band of black.

Mantle, back, and median and lesser coverts pale blue-grey. Rest of coverts and scapulars grey, tipped black, creating prominent dark bar across open wing on upperside, as in immature Little Gull. Primaries black with some white spots or "mirrors" on tips. Inner triangle of wing pale grey to off white.

Bill very short and fine, black with reddish-brown base. Eye black and rather large. Feet not seen.

The bird was considered to be a sub-adult Ross's Gull *(Rhodostethia rosea)* in immediate post first winter plumage. This record is one of several reported from various parts of Britain during 1974 and has been accepted by the Rarities Committee of *British Birds*.

The immature bird seen at Christchurch, Hampshire in July 1974, which was illustrated in the November 1974 edition of *British Birds*, showed a very similar plumage pattern to our January Bridlington bird. The Christchurch individual, however, had less black in the wing and had the addition of a black neck-ring, both signs of further maturity. It is just conceivable that these two records refer to the same individual.

There are two earlier records of Ross's Gull for Yorkshire. The first was shot at Tadcaster in the winter of 1846/47. The whereabouts of this specimen are at present unknown. The second was an adult in winter plumage, seen also at Bridlington, in February, 1962. There are at present eleven records for Britain.

The species is normally confined to the Arctic, breeding in a very restricted area of north-east Siberia, and wintering, probably, in the Arctic Ocean.

M. Densley.

Behaviour of Black Terns at Fairburn Ings Nature Reserve

Black Terns, *Chlidonias niger*, occur at Fairburn in the spring of most years, usually in early to mid-May after a spell of easterly winds. Some of the more spectacular occurrences have been of 38 on 23rd May, 1959; 51 on 13th May, 1962; 42 on 12th May, 1965; and 67 on 30th and 41 on 31st May, 1966.

On the evening of 16th May 1974, 16 Black Terns were widely scattered hawking for insects over the water between the Cut hide and the railway embankment at the eastern end of the Reserve. With several other observers, I watched these birds for half an hour or so as they twisted and dipped in their typical manner to pick insects from the surface. Periodically one or two birds perched temporarily on posts jutting out from the water.

Whilst watching, I witnessed a behavioural incident which I had never seen before. Quite quickly, as if at some signal, eight of the widely scattered birds came together into a compact group flying low over the water and began a communal bathing. The birds did what I can best describe as a "belly-flop" into the water and then rose again, shaking wings and feathers in flight. The procedure was repeated several, probably six or seven, times though not by all birds simultaneously. This tight group of birds then all retired to a line of posts and perched there where they were gradually joined by the remaining birds. This presented an easy opportunity to make the first certain count of all birds present.

I have not searched the literature extensively, but neither the *Handbook of British Birds* (Witherby, Jourdain, Ticehurst and Tucker, 1938) nor *Water Birds with Webbed Feet* (Geroudet, 1959), which contains useful information on display and behaviour, mention any such communal bathing by Black Terns.

At 06.00 hours the following morning, 17th May, there was no sign of any Black Terns but in the evening I was told that there were again 9 birds on the Reserve. Approaching Fairburn from the A.1 at 20.10 hours Robert Knight and I were just in time to see 7 of these birds climb quickly and head away to the east — a pattern frequently noted at Fairburn.

R. F. Dickens

Late 1974 Records of Summer Migrants

At 14.00 hours on 14th December, 1974 I walked to Ossett passing a recently occupied housing estate, most of which had small, neat gardens with rockeries, lawns and rose beds. My attention was attracted to one of the rose beds in the garden of a house near the road where I saw a small bird which on further investigation proved to be a Phylloscopus Warbler.

I watched the warbler which was very tame as it moved about the bushes looking I suspect for aphids and other small insects. Despite the weather which was cold and blustery with a strong north-westerly wind the bird looked in quite good plumage. I also noted that the legs were very dark and I have no doubt that the warbler was a Chiff Chaff *(Phylloscopus collybita)*. I watched the bird for some five minutes and it was still feeding when I resumed my journey to Ossett.

Although a summer resident it is known that some birds over-winter in the south of England but records from the north of England can be regarded as exceptional.

A. Frudd

On Saturday, 21st December, 1974, whilst Dr. J. D. Pickup and I were standing talking in the garden at Glasshoughton, Castleford, a female Blackcap *(Sylvia atricapilla)* alighted in a bed of Frensham roses some 10-12 feet away from us. Our presence obviously distracted the bird and it flew away within a few seconds without attempting to seek for food.

There has been an increase in the number of winter records of this species in recent years but probably fewer female birds are seen than males.

R. F. Dickens

Orthoptera in the Spurn Head area

The provisional atlas of 10 kilometre square records prepared by Michael Skelton and published by the Biological Records Centre of Monks Wood Experimental Station in May 1974 indicated that there were apparently no post-1961 Orthoptera records for Spurn Head. Nevertheless earlier records for the area included the most northerly in Britain for the local Bush-crickets *Conocephalus dorsalis* (Latreille) and *Metrioptera roeselii* (Hagenbach) and the most northerly east coast station for the Grasshopper *Chorthippus altomarginatus* (Degeer). Accordingly it seemed to me most desirable that the area be visited for an up-to-date reassessment of its Orthoptera populations.

Fortunately my work entailed a visit to Yorkshire in July 1974 and my intention to visit Spurn Head was enthusiastically received by Dr. Sutton, who kindly placed the use of his observatory laboratory at my disposal.

I arrived at the Warden's house in the late afternoon of July 13th and was immediately made welcome and able to commence investigations in the early evening. During the remaining daylight on the 13th and until the early afternoon of the 14th, when the fine weather was broken by a thunderstorm, I explored an area from the lighthouse northwards to Long Bank. Only two species of Orthoptera were found on the dunes of Spurn Peninsula itself, *Chorthippus brunneus* (Thunberg), the Common Field Grasshopper and *C. albomarginatus*, the Lesser Marsh Grasshopper, but both species were abundant with many adults even at that early date. The latter species was undoubtedly the most widespread and common orthopteron in the area, for whereas the Common Field Grasshopper was confined to the dunes the Lesser Marsh occurred everywhere, particularly along the dyke that runs behind the sea wall from Kilnsea, north-westwards to Patrington Channel. It was along this dyke system that I located several nymphs of *Conocephalus dorsalis*, the Short-winged Cone-head. The pleasantest surprise however was the discovery of a female final instar nymph of *Metrioptera roeselii* (Roesel's Bush-cricket) at the north end of the newly enlarged lagoon on the coast south-east of Easington, at the northern limit of the nature reserve. I did not find any specimens of *Myrmeleotettix maculatus* (Thunberg), the mottled Grasshopper although this had been recorded from Spurn before 1961. Two other common and widespread British Grasshoppers, *Omocestus viridulus* (L.), the Common Green Grasshopper, and *C. parallelus* (Zetterstedt), the Meadow Grasshopper, were not located either and are apparently unknown in the area. Incidentally I was impressed by the dune flora of Spurn Head which contained a number of local and attractive plants growing in great profusion.

E. C. M. Haes

J. J. MARSHALL'S BRYOLOGICAL COLLECTION: PART 3

M. R. D. SEAWARD

During the course of examining the bryophyte collection of C. A. Cheetham (1875-1954), now in the possession of Mr. G. A. Shaw, I came across further material collected by Joseph Jewison Marshall (1860-1934). Although this material comprises only twenty packets, the data are worth recording since they complement previous published lists (Seaward, 1962, 1964), and indicate that Marshall's packets were in freer circulation than was first envisaged. It is presumed that his major collection(s), representative of his work on the bryophyte floras of East Yorkshire and North Lincolnshire, perished as a result of enemy action on the Hull Museum during the Second World War (Seaward, 1962), and probably also when, it is believed, certain natural history collections were "committed to the incinerator" at the disbandment of the Grimsby and District Antiquarian and Naturalists' Society in 1952.

The handwriting (with the usual name contraction of 'JJM') on the Cheetham collection packets is unmistakably that of Marshall.

The nomenclature of the following list is according to Warburg (1963), and in each instance the locality, with Watsonian vice-county number given in parentheses, and date of the collection are indicated; published references are also given where relevant.

I should like to express my thanks to Mr. G. A. Shaw for allowing me to study his herbarium, and to Mr. R. D. Fitzgerald and Mr. E. C. Wallace for confirming several of the identifications.

Seligeria paucifolia (Dicks.) Carruth.
Goodmanham (61), 1896, *c.fr.*

Dicranella varia var. *callistoma* (With.) Schimp.
Goodmanham (61), December 1898, *c.fr.*; as *Anisothecium rubrum* var. *callistomum* in Marshall (1902).

Tortula ruraliformis (Besch.) Rich. and Wall.
Humberstone sandhills (54), April 1910, *c.fr.*

T. subulata var. *angustata* (Wils.) Limpr.
Swinemoor, Beverley (61), May 1900, *c.fr.*; as *T. angustata* in Marshall (1902).

T. vahliana (Schltz) Wils.
Waltham Beck, Cleethorpes (54), May 1911, *c.fr.* (see *Naturalist*, 1911, 238).

Aloina brevirostris (Hook. and Grev.) Kindb.
Gravel pit, Kiplingcotes (61), September 1912, *c.fr.*; given as extinct for East Yorkshire in Warburg (1963), where extinction is defined as "not been seen for a long time (usually since 1900)" and where such areas have been "well-worked".

Pottia heimii (Hedw.) Fürnr.
Humberstone sandhills (54), May or June 1910, *c.fr.*

P. bryoides (Dicks.) Mitt.
Walkington Towers (61), April 1909, *c.fr.*

Phascum curvicollum Hedw.
Kiplingcotes (61), December 1895, *c.fr.*

P. cuspidatum Hedw.
Market Weighton (61), February 1899, *c.fr.*

Barbula hornschuchiana Schultz
Millington (61), undated; this material is that collected during the Yorkshire Naturalists' Union excursion to Pocklington in August 1905 (see *Naturalist*, 1905, 269).

Weissia crispa (Hedw.) Mitt.
Goodmanham (61), April 1909, *c.fr.*

Physcomitrella patens (Hedw.) B., S. and G.
Pondside, Towthorpe footpath, Market Weighton (61), July 1898, *c.fr.*

Ephemerum serratum (Hedw.) Hampe
Market Weighton Common (61), February 1899, *c.fr.*
Bryum warneum (Röhl.) Bland. ex Brid.
Humberstone sandhills (54), July or August 1911, *c.fr.* (see *Naturalist*, 1911, 367).
B. pseudotriquetrum var. *bimum* (Brid.) Lilj.
Brickyard, Heneage Road, Grimsby (54), July 1912, *c.fr.*
B. radiculosum Brid.
Chalk quarry, Barnoldby-le-Beck (54), December 1913, *c.fr.*; new divisional record for Lincolnshire and pre-dating the first record by Miss A. Holderness from Grebby in 1923 (see Seaward, 1969).
Cirriphyllum piliferum (Hedw.) Grout
Oven Wood, Goodmanham (61), May 1895; as *Hypnum piliferum* in Marshall (1902).
Eurhynchium swartzii (Turn.) Curn.
Wood, Aylesby Bog (54), November 1913, *c.fr.*
Rhynchostegiella pumila (Wils.) E. F. Warb.
Weelsby Woods (54), March 1915, *c.fr.*; as *R. pallidirostra* in Seaward (1962, 1964).

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Marshall, J. J. (1902). *East Riding Mosses and Hepatics* in J. F. Robinson's *The Flora of the East Riding of Yorkshire*, pp. 226-43, London.
Seaward, M. R. D. (1962). J. J. Marshall's bryological collection. *Naturalist*, 1962, 133-6.
—— (1964). J. J. Marshall's bryological collection: Part 2. *Naturalist*, 1964, 67-8.
—— (1969). *A Bryophyte Check-List for Lincolnshire.* Lincoln.
Warburg, E. F. (1963). *Census Catalogue of British Mosses.* ed. 3. Brit. Bryol. Soc.

A Bryological Mystery Solved

The late Dr. T. H. B. Bedford, in a note on *Hypnum crista-castrensis* L. *(Ptilium crista-castrensis)* in Yorkshire (*Nat.* 1940, 201), mentions an obscure reference in *Nat.* 1894, 10, to the occurrence of this moss near Gisburn in Ribblesdale. The 105th meeting of the Union was held at Hellifield on Monday, August 7, 1893, for the investigation of the Ribble valley from Gisburn to Sawley Abbey. The circular for this meeting (Circ. 105) copies information from Davis & Lees' *West Yorkshire* (1878) and gives a long list of plants "of the Ribble plain, upon the river banks and adjacent pasture and bog-land from Settle, Long Preston, and Wigglesworth to Bolton-by-Bowland and Sawley." After the list of flowering plants four mosses are named, viz.: *Tortula intermedia, Hypnum (Rhytidium) rugosum, Hypnum (Ctenidium) molluscum* and *Hypnum (Ptilium) crista-castrensis.* The area covered by the list should be carefully noted, along with the fact that *Rhytidium rugosum* and *Ptilium crista-castrensis* had both been recorded in the past from Giggleswick Scar.

The report on this meeting (*Nat.* 1894, 9-10) says that "among the botanists were Mr. Chas. Crossland of Halifax and Mr. T. F. Ward of Middlesbrough. The plants met with were quite what might have been expected and call for no special notice, excepting that Mr. Crossland was somewhat surprised to see the Purple Loose-strife. About 160 flowering plants were noticed near Sawley Abbey, amongst which were the following:—" Then follows a long list of plants which is identical in all respects with the list given in the circular except for the addition of a further ten flowering plants. The four mosses mentioned in the circular are also given again.

There is not the slightest doubt that the list given in the report of this meeting was a copy of that given in the circular, which is somewhat misleading to say the least since the list in the circular covers the whole valley from Settle to Sawley, whilst that in the report purports to be for Sawley only! Again, some of the plants listed, e.g. *Sedum villosum*, are highly unlikely to occur at this low altitude.

There is no doubt in my mind that *Ptilium crista-castrensis* and *Rhytidium rugosum* were never known in the Sawley district at that time. I ought perhaps to point out, however, that *Rhytidium rugosum* was found on limestone near Downham in Lancashire, only a few miles from Sawley, in 1936 (see Travis's *Flora of South Lancashire*, 163).

G. A. Shaw

BRYOLOGICAL MEETING AT SPURN

F. E. BRANSON

The autumnal Bryological Meeting at Spurn held on 14-15 September, 1974 was well attended and favourable weather pervaded the whole weekend. About 30 species had been recorded from the peninsula and the present list, although not long, adds a few more to the total. Saturday was devoted to the Y.N.T. Nature Reserve at the end of the peninsula and we first devoted our attention to the short sandy turf and the artificial chalk bank running down the centre. In the sandy turf was much *Brachythecium albicans, Barbula fallax, B. convoluta, *B. unguiculata, *B. recurvirostra, *B. rigidula, Pottia heimii, Bryum pendulum, *Tortula intermedia* and *T. ruraliformis*. On the chalk bank were *Hypnum cupressiforme, Ceratodon purpureus* and patches of **Pottia intermedia*.

At the end of the peninsula, near the lighthouse, was a patch of tall *Tortula ruraliformis*, with **Hypnum cupressiforme* var. *ericetorum, Brachythecium rutabulum, *Amblystegium serpens, Bryum argenteum, *B. bicolor, Eurhynchium praelongum* and a few stems of the hepatic *Lophocolea bidentata*.

On our return to the other end of the reserve a few additional species were found. In a stubble field was a quantity of fruiting **Pottia truncata* and the small rosettes of the thalloid hepatic **Riccia glauca*. A dried-up pond had masses of *Drepanocladus aduncus* around the edges. Miss Dalby also recorded **Acrocladium cuspidatum* and *Drepanocladus fluitans* from wet ground near the hotel at Kilnsea.

On Sunday we went to Easington and a distance along the coast, but here the number of species seen was even less than on the previous day. On a bank by the canal were quantities of *Pottia heimii*, found by Miss Dalby, and unmistakeable for so small a moss by the operculum, elevated above the mouth of the capsule and remaining attached to the columella, giving a striking and distinctive appearance to this species when the fruit is mature. It is one of our few distinctly maritime mosses and was a new species to all of us. Mixed with this was **Dicranella varia*. The remaining species recorded were:— **Barbula unguiculata, Ceratodon purpureus, Brachythecium albicans, B. rutabulum, Eurhynchium praelongum, Bryum argenteum* and *B. bicolor. Drepanocladus aduncus* was abundant in the canal.

Previous lists for Spurn have been published by C. A. Cheetham and W. H. Burrell (*Nat.* 1919: 389), F. E. Milsom (*Nat.*. 1928: 278) and A. Thompson (*Nat.* 1946: 156). About half the number of species recorded in these lists were seen on this visit and those not previously listed are marked above with an asterisk.

My thanks are due to Mr. G. A. Shaw for providing lists of previous records for the area and to Dr. D. Chamberlain for examining species of *Pottia*.

BOOK REVIEWS

Wild Flowers in Colour. Illustrated by E. Hahnewald with descriptions by J. Hutchinson. Pp. 128 with 128 colour plates. Penguin Books, 1974. £1.50.

This is a reissue of a book first published in 1958 and built around a series of coloured pictures originally prepared for a Swedish Flora. About 550 species are depicted. Apart from a fuzziness of outline in some, the illustrations, four or more to the page, are good without being exceptional. The descriptions are also adequate but the selection of species included is often incomprehensible. Several are not even British species, many more are so very rare in Britain that the user of the book is unlikely ever to come across them and in other instances rare species are included such as *Genista pilosa, Hypochoeris maculata* and *Schoenus ferrugineus* while the widely distributed species in the same genera receive no mention. The present reviewer can see little justification for the issue of this book when several superior ones of its kind designed for the same type of user, are already available.

W.A.S.

British Seals by **H. R. Hewer.** Pp. 256 with 24 monochrome plates, 54 text figures and 21 tables. Collins. £3.50.

British Seals is a distinguished addition to the *New Naturalist* series of books on British natural history. The author, the late Emeritus Professor H. R. Hewer, was one of the small band of enthusiasts who, in the post-war years, did so much to discover the life history of the grey seal, at that time a comparatively unknown British mammal. Not unnaturally the greater part of the book is devoted to the grey seal, but there are two chapters on the much less well-investigated common seal as well as brief accounts of stragglers such as the walrus, and the ringed and bearded seals which, from time to time, are recorded in British waters. World conservation of seals, and the associated research, are discussed briefly in an appendix while the progress of seal conservation in Britain is dealt with more fully: here Professor Hewer's comments on the desirability of managing seal populations are particularly valuable and apposite.

The extensive bibliography is the first attempt in this country to gather together the many papers and books that have appeared on British seals and as such it provides suggestions for further reading. Professor Hewer makes frequent references to the Farne Islands seals and it is therefore unfortunate that he omits the definitive work on this colony—*Grey Seals and the Farne Islands* — from this bibliography. The book is extensively illustrated (although the photographs vary somewhat in quality), and the line drawings are both attractive and useful; it also includes numerous maps, diagrams and tables.

British Seals is a "must" for anyone concerned with this country's wildlife, whether he be the amateur naturalist interested solely in the daily life of seals, or the expert who wants more precise information on such subjects as their anatomy or reproduction.

G.H.

The Dictionary of Birds in colour by **Bruce Campbell.** Pp. 352 including 192 colour plates, 9 line drawings and 1 text figure. Michael Joseph, 1974. £6.00.

It is difficult at first glance to see why this book is called a Dictionary of Birds as, dealing only with species, it is certainly not in the Newton tradition neither is it possible to think of a bird and look it up. The main section of the book is the series of colour plates of the different bird families of the world. These illustrations vary from one per large quarto plate through various combinations to eight per plate. A very large number of photographers are therefore represented, some by only one photograph others by dozens. This variety of techniques and settings makes an interesting compilation but leads to some curious selections, some extremely rare forms being included whilst other fairly common and widespread species are missing. The species illustrated in these family groups are then described in the next section in an alphabetical list, presumably the dictionary, with intercalations of lists of common names cross-referenced to the proper names under which descriptions will be found, and not all of which are illustrated. In all, the book claims to cover about one eighth of all the known species of birds, certainly — and welcomely — on a world-wide basis. Essentially, therefore, this is a picture book of birds giving a good impression of the range of form and distribution within any one family of birds. A brief section of introduction to the faunal regions of the world and their characteristic avian fauna, drawing attention to the most recent changes, and an extremely brief statement on the bird's anatomy, are useful appetisers.

For those who like birds there is always something to be learned from a different approach and this is a very nice book to handle and look at. Its world coverage gives some understanding of the wide distribution of some families and the extremely restricted evolution of others which fill specific ecological niches in particular regions. The book could therefore be said to fulfil two functions, to provide a colourful interest in birds of various regions for the amateur and to yield interesting information for the deductive specialist.

I.W.

A Guide to the Birds of Wales by **David Saunders.** Pp. 341 with 13 maps and 21 black and white illustrations. Constable, 1974. £2.50.

Regional guides for ornithologists pour out from the publishing houses. It is a relief to read one which is a model of this type of publication. After a general introduction, the old traditional counties of Wales are described. The introductory, historical and geographical surveys are most interesting and illuminating, often giving unexpected items such as "Pembrokeshire can expect to have at least thirty-two gales annually". An "Information" section follows with details of county avifaunas, reports, recorders, ornithological society and other representatives, finishing with tourist information. The sites of interest are shown on clear maps, followed by detailed descriptions of places and their birds and a check list concludes each chapter. One could not fault the information by checking it against personal knowledge of the areas described.

A list of Welsh bird-names might be useful to a tourist who had the courage to try it out.

The author makes a plea for records to be kept and observations maintained in some of the less known places in this beautiful country. By indicating the places which could be rewarding to the ornithologist this book should do much to achieve this objective. The illustrations are of excellent quality and combine to make this handy, pocket-sized volume a valuable asset to the bird-watcher in Wales.

J.D.P.

Collins Guide to the Sea Fishes of Britain and North-Western Europe by **Brent J. Muus** and **Preben Dahlstrom.** Pp. 244 with numerous colour plates, distribution maps and sketches. Collins, 1974. £2.95.

The Collins Guide series has set a very high standard in books designed for the non-professional yet non-dilettante biologist. Their merit lies in their range of accurate and concise information arranged to give a maximum of convenience in use and their profuseness in high quality illustrations. The text of the present volume is written by Brent J. Muus of the Danish Institute of Fisheries and Marine Research. Preben Dahlstrom's splendid paintings deserve unqualified praise; his art work for this and the companion volume on freshwater fishes place him in the highest rank of fish illustrators. In other volumes of this series all the colour plates have been specially prepared from fresh specimens, but several of the marine fishes described in this volume are so sporadic within the area covered that not all were available for painting from freshly caught examples. Even so 142 out of a total of 173 species described were drawn from fresh specimens. The text, in addition to the descriptive accounts and distribution maps of the species, includes identification keys and sections on the structure and biology of fishes, on the history of marine fisheries, the practical techniques of the industry and a modern scientific investigation of fish and their conservation. The combination of sound information coupled with illustrations which delight the eye whilst informing the mind is such that a mere recommendation of this book to all seriously interested in marine fishes would be a gross undervaluation of its merits.

W.A.S.

Britain's Wildlife by **Brian Grimes** with photographs by **John Markham** and a foreword by Eric Hosking. Pp. 125. Collins, 1974. £1.95.

So many of John Markham's photographs have been used in so many *New Naturalist* volumes, that his name and the very high standard of his work are familiar to most naturalists. This book includes over 150 of his photographs of birds, mammals, reptiles, insects and plants with commentaries by Brian Grimes. Some have artistic or aesthetic qualities which make them outstanding but as all are John Markham's work they are *ipso facto* never less than first-rate. This picture book of Britain's wildlife epitomises his professional skill in recording a wide range of animals and plants and as such will be of particular interest to wildlife photographers.

Life on the Sea Shore by **John Barrett.** Pp. 160 with 24 photographic plates and 80 text figures. Collins, 1974. £1.95.
Birds by **Christopher Perrins.** Pp. 176 with 24 photographic plates and 61 text figures. Collins, 1974. £1.95.
Woodlands by **William Condry.** Pp. 176 with 24 photographic plates and 93 drawings. Collins, 1974. £1.95.

These three books are the first of a new *Countryside Series* designed to give the beginner an introduction to modern natural history.

John Barrett has perhaps the hardest task as his subjects are less familiar to the general reader and he has to call in the aid of a glossary of technical terms. Helped by excellent line drawings and photographs he covers the full range of animals, seaweeds and lichens found on the shore, guides the landlubber through the intricacies of tides and currents and summarizes briefly but clearly zonation on the shore, food chains and the pyramid of numbers. Misprints are mostly trivial but a brave attempt to explain meiotic and mitotic division in a single diagram appears foolhardy when 4 x 2 chromatids are somehow derived from three pairs of chromosomes and the result is said to be "naploid". The impermanence of scientific names is unwittingly demonstrated when the Flat Winkle, described as *Littorina obtusata* in the text, becomes *L. littoralis* in the caption to the accompanying line drawing. The text is enlivened by numerous quotations and even cooking "receipts" for curried prawns, stewed mussels and cockle pie. There is a vivid description from first hand experience of the effects of a storm on the coast of Pembrokeshire.

Christopher Perrins deals with a more "popular" group and devotes each chapter to a single broad aspect of avian biology, illustrated by examples drawn mainly from European birds. Evolution, natural selection, adaptations for feeding and for breeding, migration, moult and population dynamics are discussed in clear, concise terms and illustrated with helpful diagrams and line drawings. The photographs are well chosen to accompany the text and vary in artistic merit from a rather repellent group of plucked Garden Warblers from Uganda showing different stages of migratory fat deposits to Eric Hosking's superb studies of Bittern and Greenshank removing egg-shells from their nests.

Scientific names are given in the index after each bird mentioned in the text and this practice might have been copied with benefit in the third volume where Latin is used rather grudgingly; confusion is unlikely over the Rannoch sprawler but what exactly is the Rock Arabis? William Condry's text is deceptively easy to read and he treats each type of woodland as a living community, tracing the inter-relationship of soil, plants, fungi, insects, birds and mammals together with the over-riding influence of man. Again the illustrations supplement the text most effectively though a rather over-simplified map of Highland Britain shows the hills of Antrim and the Isle of Skye in the lowland zone. Eric Simms is mis-spelt in the index.

The authors are all field naturalists of wide experience and teaching ability and these three books can be recommended unhesitatingly as "best buys" for beginners interested in their subjects. We look forward to the next volumes in the series.

L.L-E.

The Geology of the Appleby District by **H. C. Versey.** 6th edition: pp. 48 with one plate and five figures. Whitehead & Son (Appleby) Ltd., 1974. 75p.

It is 34 years since the original issue of Professor Versey's account of this geologically famous region. The fact that it has now reached a sixth edition is sufficient proof of its continued usefulness and popularity. Each successive edition has taken account of recent investigations in the area which have necessitated additions and changes and this is so in the present edition. The recommended excursions, with accounts of the geological features to be seen on them, now number thirteen; and the list of references is enlarged to include several recently published, geological papers dealing with this area.

W.A.S.

The Senses of Animals by **E. T. Burtt.** Pp. viii+158 with 54 text figures. Wykeham Science Series, Wykeham Publications, London, 1974. £2.50 (paperback).

I found Dr. Burtt's book most enjoyable. In covering such a large subject in only 159 pages there are, inevitably, a few gaps and some rather general, sweeping statements. However, I found it remarkably comprehensive for a book of its size and at the same time it does not give any impression of superficiality and I would strongly recommend it to students as an introduction to the subject.

The first chapter considers how we obtain and make use of sensory information and provides a brief introduction to the structure and function of sense organs and to the problems of integration in the central nervous system. The approach is interesting and refreshing. Subsequent chapters deal with each sense in turn: chemical, mechanical, hearing, vision (two chapters), electrical. The final one includes pain, temperature, humidity and magnetism and rounds off with a short appraisal of 'unknown senses'. There is throughout a good blend of fact and theory. There are few typographical errors.

The text is very well illustrated. In a few instances the figures could be improved. For example, figure 1.2B does not show any sensory nerves, as suggested in the text, and parts of figure 3.8 have not reproduced very well. Also there is a consistent use of lower case letters in the text and in the legends, whereas the letters on the figures are upper case. However, these are minor criticisms, for on the whole the figures are well chosen and of good quality.

P.J.M.

British Harvestmen by **J. H. P. Sankey** and **T. H. Savory.** Pp. 76 with 27 figures and 7 maps. **British Sea Spiders** by **P. E. King.** Pp. 68 with 28 figures and 5 maps. Numbers 4 and 5 respectively in the Linnean Society (New Series) Synopses of British Fauna. Academic Press, 1974. £1.90 each.

During the early 1940's the Linnean Society of London published a series of very useful and successful little handbooks in their series "Synopses of the British Fauna". The section dealing with the opilionids received a reprinting in 1948. It is now heartening to see the Linnean sponsoring a new series of synopses. Synopsis number 4 again features the harvestmen, a long-awaited treatise by the two 'old hands' of opilionid studies, Theodor Savory (author of the earlier work) and John Sankey. Although falling short of what is required, this fascinating booklet, which includes much new material, has appeared at an opportune time, coinciding with the national harvestspider distribution scheme recently launched by the British Arachnological Society. The booklet reviews the scant literature on harvestmen, outlining the material under such headings as: life history, feeding, defence mechanisms, behaviour, respiration, ecology, collecting and preservation, laboratory culture and distribution. The work is designed to stimulate further work by forming a bridge between popular field guide and monograph, but it is clear that the monographs are still to be written and that the literature drawn upon seems heavily laced with earlier introductory works. The well-written sections certainly provide an admirable introduction but also serve to demonstrate the paucity of work since Savory's synopsis of 1948.

Sadly this badly needed booklet is something of a let-down both in content and standard. For brevity, the known county distribution, little changed since Bristowe's work of 1949, has been tabulated, while on the other hand, the distribution of six, poorly-recorded species appears as full-page maps. The use of vice-county distribution units is, by today's ten kilometre square standards, crude, uninterpretable and in the incomplete state, misleading and unnecessary. Both tabulation and maps contain errors. Taking the Yorkshire records alone, the 1961 V.C.64 records of *Anelasmocephalus cambridgii* are omitted and strangely the published records of the V.C.63 *Nelima sylvatica* and the V.C.62 *Oligolophus meadii*, both of which Sankey identified, are also omitted.

The key generally works well for these extremely variable organisms, however the trident of *O. meadii* is described in the key as pointing upwards whereas in the text it is stated to be

"directed well forward". The standard of illustration is generally poor and sometimes extremely bad, although the frontal views of the opistomas are a new and novel departure and may be helpful if the specimen can be positioned correctly.

Through its errors, poor illustrations and through inferring the vast scope for new work, this little handbook will no doubt spur the new generation of opilionists into making the headway so badly needed.

Synopsis number 5 on *British Sea Spiders* by P. E. King is a polished production and something of a trip into the unknown for those unfamiliar with these 'other worldly' creatures. This welcome laboratory manual which is largely a follow-up to P. E. King and G. B. Crapp's splendid paper on British Pycnogonids published in *Field Studies* Vol. 3, No. 3, 1971 will be a useful standard work for both students of marine biology and seashore naturalists alike. The Linnean Society is to be congratulated on making available this work which will surely be the key to further studies by a greater spectrum of workers on this very neglected group.

Like other synopses in the series, this work carries sections on morphology, feeding, life-history, collecting and preserving specimens, though of course with their physiology and ecology being undocumented the emphasis is placed on taxonomy, identification and their known British distribution. The figures are elegant examples of biological illustrations and for this feature alone the work can be held up as a model.

C.A.H.

Techniques of Biological Preparation by **John Simpkins.** Pp. 100 with 8 plates. Blackie, 1974. £2.50.

With this small book, the author opens the door to the biological technician's laboratory and indicates some of the methods by which the laboratory magicians convert the useless to the valuable. The strength of the book finally rests in the lists of references in which the technician's bibles are included. Its main weakness is the overall scant treatment it affords those aspects of the chosen field which it touches upon, doubtless necessitated in part by the small physical size of the book. The plates are attractive, though I feel unnecessary in a technical man's guide; the expense could have been directed towards more useful data, for instance list of reagents etc. Nevertheless John Simpkins' book will prove useful to those desirous of increasing their technical ability in biological preparation.

P.S.

Index to Drawings of British Plants by **Stella Ross-Craig.** Pp. 39. G. Bell and Sons, 1974. £3.50.

This comprehensive index to the long series of parts which began publication in 1947 brings to a close Stella Ross-Craig's universally acclaimed work. A list of authors' names precedes the single index covering English and Latin names and synonyms. The artist, publishers and all users of this splendid series of drawings will derive great satisfaction from the successful completion of an outstanding publication.

The Observers Book of Garden Flowers compiled by **David Pycroft.** Pp. 192 with 150 coloured illustrations. Frederick Warne, 1974. 60p.

In this revised edition 150 illustrations in colour replace the 100 colour and 100 half-tone illustrations of the previous edition and a chart showing times of sowing, planting and flowering has been added. Most popular garden flowers are included, the illustrations are adequate for recognition and these together with the cultural hints will give the inexperienced gardener many ideas for stocking his flower beds.

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SYNANTHROPY AND THE DEATH-WATCH; A DISCUSSION

P. C. BUCKLAND

The death-watch beetle, *Xestobium rufovillosum* Deg. (Col,, Anobiidae), is probably the most widely known insect closely associated with man and, although actually seen by only a few, the majority of people have heard of the damage which this species has caused to structural timbers in old buildings, including Westminster Hall and Lincoln Cathedral. Throughout Western Europe and North America, the characteristic tapping of the beetle on the sides of its galleries has been regarded as an omen of death. The earliest reference to the death-watch noted in the Oxford English Dictionary was written in 1668 and there is a tendency in most other European languages to equate the tapping with the ticking of a clock or the passage of time: German *Totenuhr*, French *horloge de la morte*, Italian *orologio delle morte*, and Spanish *relog de la muerte*. Such symbolism is widespread in morbid superstition and would seem to imply a post-mediaeval origin for the term, since time-pieces only became general in the seventeenth century. The root, however, lies deeper; the alternative English meaning for death-watch is, "a watch or vigil by the dead or dying" (O.E.D.) and this, by a process of association, could easily be transferred, in a society which lacked the clock, to the animal which, significantly, in Dutch is called *doodkloppertje*, the "death-knocker". The personification of death as a macabre skeletal figure, who comes to carry off the soul of the dying, seems particularly emphasised in late mediaeval Europe (Huizinga, 1955) and it is the fear of his knock which survived at least until the early years of this century in North Lincolnshire (Peacock, 1908) and no doubt still lingers on in some areas. It is easily appreciated how the sharp, staccatto rattle which the beetle makes as a mating call could, somewhat ironically, in the quiet stillness of the sick-room, be regarded as a portent of death by superstitious and nervous people. This is perhaps the limit to which any study of folklore can take us in the examination of this rather uneasy association between man and insect and it has to be remembered that folklore does not distinguish between *X. rufovillosum* and the knocking of the minute book-louse *Trogium pulsatorium* L., sub-fossil examples of which have been found associated with Roman leather from the legionary fortress of Vindonissa, now Windisch, Switzerland (Gansser-Burckhardt, 1942).

Recent research in post-glacial sub-fossil insect faunas and the study of surviving mediaeval and later buildings, however, has provided a new line of approach to the problems of the present distribution of the death-watch and a short discussion has been published in an archaeological context elsewhere (Buckland, 1974). It is necessary to first review the available biological, distributional and habitat data for the species.

Death-watch is restricted to timber which has already been subject to fungal attack (Fisher, 1940) and, in the wild it is most frequently taken from oak and willow (Freude *et al.*, 1969) but is also recorded from beech (Donisthorpe, 1939) and hawthorn (Westwood, 1839). In Central Europe it is one of the more common anobiids (Freude *et al.*, 1969), becoming rarer northwards and in Scandinavia it is restricted to the southern part of the mixed oak forest zone (Hansen *et al.*, 1960). In Britain, it occurs in the same habitats at least as far north as Oxfordshire, where Fisher (1938) was able to obtain it in large numbers from old willow trees for his studies on the biology of the species. Northwards, the death-watch becomes progressively rarer and the most northerly extensive natural records come from old oaks in Sherwood Forest, Nottinghamshire (Skidmore, pers. comm.); in Scotland, it is apparently absent from synanthropic habitats also (Hickin, 1968). Like *Gastrallus immarginatus* (Müll.), another much rarer anobiid recovered from Late Bronze Age deposits on Thorne Moor (Buckland, in prep.), *X. rufovillosum* becomes increasingly host specific towards the northern limit of its distribution and in Sherwood it has only been taken from old oaks. Allen (1956) has suggested that such an apparent restriction in choice of habitat points to a species being relict in such areas rather than a recent introduction, a status confirmed by specimens of death-watch from the Thorne Moor deposit.

On the European mainland, the species has been observed frequently to fly, being taken from flowers in Central Europe (Freude *et al.*, 1969) and noted swarming in southern

Sweden (Palm, 1959). In England, however, despite a similar macropterous condition, the beetle has rarely been seen to take flight, only using its wings and elytra to steady itself when falling or to turn itself over when laid on its back. This lack of flight records probably results from a paucity of days on which the necessary threshold tempersture is attained. Fisher (1938) has already shown that the species is significantly less active at temperatures below 17°C. and a similar loss of ability to fly is seen in the cockroaches, *Periplaneta* spp., which take flight readily in tropical latitudes but not at all in temperate ones (Rehn, 1945). This greater activity of the death-watch in warmer climates may be reflected in a subtle change in folklore. To the negroes of the southern United States, death is portended when the death-watch stops knocking (Leach, 1949). The Scandinavian distribution (Hansen *et al.*, 1960), lying south of the 17°C. or a slightly warmer isotherm for July, would appear to be directly related to temperature but this apparent coincidence may be misleading since other climatic factors require consideration.

In view of the insect's relatively thermophilous behaviour in Western Europe, it is surprising to find that the death-watch has established itself to a limited extent on the taiga around Kachug, Irkutsk region, southern Siberia, where it has bred successfully in old, dry Siberian larch (*Larix sibirica* Ledb.) ((Pleshanov, 1966). At Irkutsk (Lat. 52° 16′ N., Long. 104° 19′ E., 1,532ft. above sea level), the average January temperature is −21°C. (Met. Office, 1966) and it is therefore apparent that *X. rufovillosum* is not susceptible to intensity of cold during the winter months. Indeed, it is possible that warm, oceanic winters may have a deleterious effect on the insect, promoting winter activity, with consequent greater exposure to the vicissitudes of sudden frosts, or early emergence from the pupal cell, again exposing the imago to an adverse temperature regime (Buckland, in press (a)). Whilst the death-watch might seem to be relatively insulated from sudden climatic fluctuations in its galleries deep in the wood, Kenward (pers. comm.) has also suggested that the attack of entomophagous fungi may be encouraged by the damp, warm, humid climate of oceanic regions. Summer temperatures at Irkutsk, however, compare favourably with those from weather stations in England close to the northern limit of death-watch distribution in natural habitats in England. The average July temperature for Irkutsk is 15.5°C., compared with 16°C. at Skegness and 16.5°C. at York. The greater diurnal variation at Irkutsk, however, results in more days on which a temperature of 21°C. is achieved than in the north Midlands of England. If a threshold temperature is involved, and Schimitschek (1948) has shown that a temperature of 20°C. is necessary for the bark beetle *Ips typographus* to swarm, then the relevant threshold for the death-watch to colonise new timber occurs more frequently in the harshly continental climate of southern Siberia than in the mild climate of the north-east Midlands.

The occurrence of *X. rufovillosum* in man-made habitats is an interesting example of the ability of an old forest insect (*Urwaldtier* — Buckland & Kenward, 1973) to exploit an artificial biotope and thereby survive beyond its natural limits of distribution. In a more extreme manner this can be parallelled by *Laemophloeus (Cryptolestes) ferrugineus* and the ant *Ponera punctatissima* (Buckland, 1974; in press (b)) and by some of the more recently introduced species from the Southern Hemisphere. The initial infestation by death-watch in most structures most probably resulted from the unknowing use of pieces of infested oak. In the towns and cities which, in the lowland zone at least, as late as the early eighteenth century consisted almost entirely of timber-framed houses, the beetle had every opportunity to spread through street upon street of closely packed buildings whose very structure, often oak-shingle or thatch roofs, allowed ample provision for the fungal attack which is a necessary precursor of the death-watch. *X. rufovillosum*, north of its present natural, apparently largely climatic limit to its distribution, has been able to maintain itself in the man-made forests of houses and church roofs in our mediaeval towns. It is, however, certain that few, if any, new infestations now occur in the north and that the species is gradually being eradicated north of its present natural range (Hickin, 1968), a process which began with the spread of the use of brick for all classes of dwelling and the implementation of often stringent legislation against the use of timber and ephemeral roofing materials because of the fire risks from the late seventeenth century onwards (Jones, 1968), a change in materials which is reflected in the insect faunas (Buckland, 1974).

The problem remains as to how occurrences of death-watch infestations were engendered north of its present natural range. It is apparent from the Thorne Moor evidence (Buckland, 1973; Buckland, & Kenward, 1973) that there have been radical curtailments in the distributions of many insect species in Britain since the Late Bronze Age, resulting in the extinction of several species from the British fauna which still survive in limited areas on the Continent, and the restriction of others to often quite separate small localities in Britain. This has been particularly marked in species which have a very close association with the *Urwald*, the primaeval forest but little affected by the activities of man. On the initial suggestion of Osborne (1964), it has been suggested that these retractions result from a combination of the effects of minor climatic variations and progressive habitat destruction and disturbance during forest clearance by man (Buckland, 1973; Buckland & Kenward, 1973). The problem of death-watch infestations is complicated by the transport of timber, occasionally infested, for building purposes but, if we can assume — and there is little evidence to the contrary — that local, if dwindling resources of oak were sufficient at least until fairly late in the mediaeval period, it is probable that *X. rufovillosum* occurred in the wild much further north in the past than at the present day, a premise in part supported by the Late Bronze Age specimens from Thorne, although admittedly this locality lies only about 25km. north of its present limit in Sherwood Forest. It must be added, however, that the Sherwood populations appear to show all the characters of a relict community, remaining within the protection of their individual oaks, being relatively torpid (Skidmore, pers. comm.) and failing to attack newer diseased timber; the actual limit of viable populations of death-watch in natural habitats probably lies considerably south of Nottinghamshire but north of Oxford. Its survival in Sherwood as for other rare species from the Forest, including the alleculid beetle *Prionychus fairmairei* also recovered from the Late Bronze Age trackway on Thorne Moor, owes much to one of our earliest and much maligned conservationists, William the Conqueror, who, with the Norman aristocracy, declared large areas of England royal hunting preserves, thereby protecting from the plough a few much degraded remnants of forest in which a number of relatively rare insect species have been able to survive at least until the advent of the Forestry Commission and other over-tidy planners. These species, including the death-watch, are probably in greater danger now than at any time since the Late Saxon period.

When *X. rufovillosum* came to be restricted to its present distribution is difficult to ascertain, but a careful consideration of the available archaeological evidence will bring us closer to an answer. If the drastic curtailments in native populations of the death-watch took place in the pre-Roman Iron Age, the most probable time being the change from a more continental to a more oceanic climate during the early Iron Age, an event for which there would appear to be reasonable supporting evidence (Lamb *et al.*, 1966), there are major problems in continuity in synanthropic habitats. Towns and cities with the required substantial buildings of oak did not exist in northern Britain until the Roman period. There is also the problem of post-Roman continuity for, whilst it can be shown that many Roman stone structures in a city like York (Addyman, in press) remained standing until late in the Saxon period, it is difficult in the absence of detailed environmental data, a project which is only in its preliminary stages (Buckland, 1974), to assess the possibilities of the survival of late Roman structural timbers with death-watch infestation until the revival of an urban community in the Middle Saxon period. It is in this post-Roman period, when the artifactual evidence fails (Ramm, 1971), that the environmental sciences can make their most significant contribution to the history of some of our urban centres.

Setting aside the problems of post-Roman structural continuity, in York the death-watch was established in at least one tenement by the tenth century A.D. (Buckland *et al.*, 1974; Buckland, unpubl.) and the present populations — the beetle was present in three redundant churches examined in 1973 and also in domestic buildings in the Shambles (Rackham, pers. comm.) — probably stem from this and many similar primary infestations. It is not in the major urban centres, however, that the evidence for the curtailment of wild populations, when infestation from local natural diseased timber became virtually impossible and communities became isolated in largely man-made thermal regimes, must be

sought but in the smaller villages and isolated farmhouses, a few of which preserve late and early post-mediaeval remains. In such structures, the complications of imported timber and re-infestation from other structures and reused timbers are proportionally less, if still requiring consideration. The York evidence can be interpreted to imply that *X. rufovillosum* survived in the wild in the north-east and north Midlands at least until the Late Saxon period, the beginning of the Early Mediaeval Warm period (Lamb, 1965), when temperatures may have been in excess of 1°C. warmer. It would appear unlikely that this relatively thermophilous insect succumbed during this period, although the pressures of man on the remaining woodland have always to be considered, particularly through coppicing and charcoal burning as well as animal foraging, which would progressively reduce the amount of suitable dead and moribund timber. Some support for the survival of endemic populations in the wild until the early post-mediaeval "Little Ice Age", when temperatures fell to their lowest since the end of the Late Glacial, ten thousand years ago *(op. cit.)*, is provided by the records of death-watch in buildings in north Nottinghamshire and south Yorkshire. A late sixteenth or early seventeenth century yeoman's farmhouse at Stockbridge near Arksey, 5km. north of Doncaster, showed evidence of active infestation in structural timbers and oak panelling which had been subjected to repeated flood damage and had therefore rotted. The infestation in this relatively isolated building, probably once timber-framed, since rebuilt in stone in the early post-mediaeval period, has perhaps been in the structure since its initial construction, but many existing timbers have evidently been reused from an earlier building and the primary infestation from the wild could have taken place at any time in the later mediaeval period, when this independent farming unit is thought to have been founded. The infestation in the church roof at South Leverton, Notts., (Carr, 1916), although in a post-mediaeval feature, had probably been inherited through successive renewals from an original Late Saxon or early Norman church and many similar unrecorded death-watch occurrences must exist throughout the east and north Midlands. An origin for the infestations which predates the major phases of church building in the Saxon and Norman periods is virtually impossible and, with a similar infestation in a timber-framed tenement house in Thorne, these examples provide evidence for the existence of wild populations of *X. rufovillosum* in this area in the mediaeval period. A certain amount of negative evidence is available from buildings which are constructed of oak but which lack death-watch attack. The old vicarage at Scrooby, north Nottinghamshire, dated by M. W. Barley to 1580-1620 (Dolby, pers. comm.), is a post and truss building, which contains no apparent reused timbers and is built of rather poor fresh oak. Death-watch is absent. The beetle is also absent from 3-5, Westgate, Tickhill, where the principal post has been dated dendrochronologically provisionally to 1600-1620 (Jones, pers. comm.) and from Limetree Cottage, Waleswood, near Rotherham, a cruck-framed building dated by dendrochronology to 1630-1640 (Jones, pers. comm.), demolished in 1966. In Doncaster, the White Lion, demolished in 1971, a post and truss house of roughly the same date, was also free from death-watch and lacked evidence of the reuse of earlier timbers. It could be argued that absence was a result of better constructional methods but all the buildings examined had suffered from fungal attack to a greater or lesser extent and had sizeable populations of the furniture beetle, *Anobium punctatum*. New oak is very rarely found in eighteenth and nineteenth century buildings and that which occurs is frequently imported but, in the few structures examined, death-watch has only been noted where there is obvious utilisation of older timbers.

The limited amount of evidence available seems to imply that the restriction in range of the death-watch, of the order of a minimum of 70km., took place during the late sixteenth and early seventeenth century, a victim of the "Little Ice Age". The climatological data, however, suggests that this period was characterised by colder winters, a more continental regime (Lamb, 1965) which, in view of the Siberian evidence quoted above, should not have had a deleterious effect upon death-watch distribution. Noting the possibility of creating a circular argument, the evidence of this insect's distribution would imply a southward drift of mean July isotherms of perhaps c.70km. during this period, possibly depressing the 15°C. isotherm from north of York to the neighbourhood of Sherwood, if not further south. Subsequent amelioration has returned the isotherms at least part of the way northwards but

the beetle, with its inability to fly and consequent low dispersal potential, has been unable to follow. Only those populations protected in the artificially warmed habitats created by man remain in the north-east; a precarious existence threatened by urban renewal and insecticides. There is a little evidence to suggest that other insects were adversely affected by the "Little Ice Age". The present rarity of the longhorn beetle *Saperda populnea* may result from climatic change, although its disjunct distribution may in part be due to anthropogenic factors (Buckland, 1974) and the small, eyeless, flightless, colydiid beetle *Aglenus brunneus*, common in Roman and mediaeval deposits in York, may have been similarly influenced, although the species is strongly synanthropic (Kenward, in press).

It is apparent that much more information, both sub-fossil and recent, is required before this hypothesis can either be substantiated or rebuffed but the discussion is here presented to emphasise that a third dimension exists to the vice-county system of recording plant and animal distribution and that dimension can be provided by the careful study of the archaeological record, particularly that in the major urban centres, as York and Hull, where a rising water-table has preserved much of the material. This paper also presents a plea for an endangered species in Yorkshire; those applying fungicides and insecticides, spare a thought for the death-watch beetle, who has as much a claim to be the primary occupant as the human one.

Acknowledgements

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How to Know Western Australian Wildflowers by **W. E. Blackall** and **B. J. Grieve.** Pp. cxviii + 595. University of Western Australia Press, obtainable from Richmond Publishing Co., Surrey. 1974. £6.60.

A key to the native and introduced plants of the temperate regions of Western Australia, being the collected reissue "due to academic and public demands" of Parts I, II and III published in 1954-1965. The work consists wholly of keys to families, genera and species together with glossary and indices and is profusely illustrated throughout with sketches. Name changes and other corrections since the original issue are given on separate sheets. A fourth part dealing with Solanaceae to Compositae still awaits publication.

ASPECTS OF THE ECOLOGY OF AN INCREASING BLACK-HEADED GULL COLONY

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Banks Marsh (515 hectares) is the largest saltmarsh on the Ribble Estuary, Lancashire. It is a typical west coast saltmarsh consisting mainly of grazed *Festuca rubra* and *Puccinellia maritima* sward on the inner area, with a heterogeneous flora on the middle area composed of large amounts of *Cochlearia anglica*, *Halimione portulacoides*, *Suaeda maritima* and smaller amounts of *Armeria maritima*, *Aster tripolium*, *Plantago maritima*, *Spergularia marina* and *Glaux maritima*. The outermost (seaward) part of the marsh consists of *Spartina* sp. and *Salicornia europea* which are extending their range out over the mudflats. Between 1968 and 1973 about 85 hectares have been thus added to this saltmarsh. A large colony of Black-headed Gulls *Larus ridibundus* founded in 1954 covers (in 1973) an area of approximately 3.2km. × 0.8km. of the outermost mixed marsh and the oldest (and highest) *Spartina*.

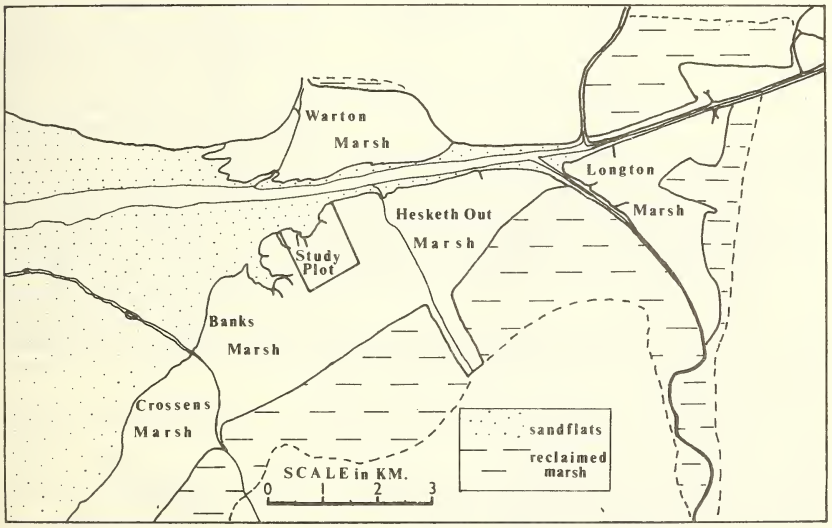


Fig. 1. The Ribble Estuary and its marshes, showing the position of the Banks Marsh study plot.

In 1968 I visited the colony five times and made some preliminary observations on clutch, brood and population size. In 1969 a study plot of about 45 hectares was marked out near Banks Bay (figure 1) and visited about every three to seven days from March to early August every breeding season from 1969 to 1973 inclusive. The study plot was chosen so as to include a cross section of the gullery, including high density of nests in the middle and the well-scattered nests at the edge of the gullery. At about fortnightly intervals the whole gullery was surveyed to collect information for an annual census and to allow comparison with the study plot.

During recent years the ecology and breeding behaviour of gulls, especially Herring and Lesser Black-backed Gulls *Larus argentatus* and *fuscus*, have been well studied. However the present study is of interest for two reasons. Firstly, despite several surveys (e.g. Harris 1964, 1970 and Brown 1967) it is still not clear why some species of gulls have increased

during the past fifty years. Secondly, it is one of the few attempts to study the ecology of a well-documented Black-headed Gull colony.

Population Growth

Black-headed Gulls in north-west England suffered greatly from human persecution during the 19th and early 20th centuries. Some small colonies were destroyed as mosslands and heaths were drained and cleared for agriculture (see discussion), others were displaced as new townships were built (e.g. by the town of Fleetwood built from 1836), whilst others suffered intense egg-collecting. Only one colony, that on Walney Island, thrived probably because of its relative inaccessibility (Porter 1876, Mitchell 1885, Oakes 1953). The Lesser Black-backed Gull was also persecuted during these years (Greenhalgh 1974a) and perhaps human pressure resulted in this species together with Herring and Great Black-backed Gulls *L. marinus* forming less accessible colonies on Walney Island and the Bowland Fells. At both sites these larger gulls thrived, on Walney to the detriment of the Black-headed Gulls and terns *Sterna* spp.

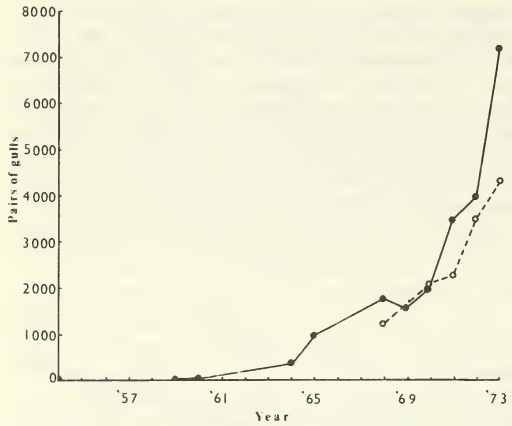


Fig. 2. Censuses of Black-headed Gulls *Larus ridibundus* in the Banks Marsh colony (solid circles) together with the expected population sizes (open circles) in recent years calculated from earlier censuses and estimates of breeding output and mortality estimates (see Discussion).

Black-headed Gulls first bred in any numbers on Banks Marsh in 1954, though some local residents admit to collecting a few eggs prior to this. Since then the colony has grown rapidly to 7,200 pairs in 1973 (figure 2). The gullery has also increased in area (figure 3) and smaller colonies were set up on nearby Longton and Warton Marshes.

Such a pattern and timing of increase is very much in line with those reported in the larger gull populations (summary in Harris 1970). Because these increases include so many gull species it is improbable that they have been due to genetic mutation which results in individuals being able to rear more offspring or efficiently use some already present environmental resource. It is more likely that the increase has been due to an increased food supply enabling more young to be reared and/or reducing the annual mortality rates of adults and young or to the reduction of persecution.

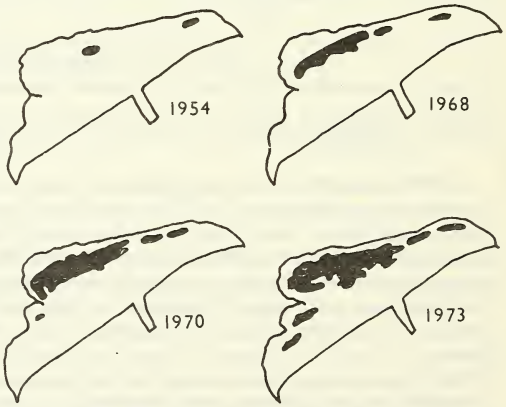


Fig. 3. The increase in area of the Banks Marsh gullery, 1954-73.

Breeding Biology

Clutch sizes (excluding replacements) was similar in the six years. The commonest were three eggs

(1,627 clutches) and two eggs (1,174) with fewer of one egg (584) and extremely rarely four eggs in a nest (3) giving a mean first clutch size for the six years of 2.32 eggs. This excludes one clutch of five and one of seven eggs which were probably laid by more than one female. The large proportion of clutches with one egg is possibly due to a high proportion of young females in the colony, younger females having been shown in some species, e.g. Kittiwake *Rissa tridactyla* (Coulson and White 1961) to lay fewer eggs than older females, though the age structure of this colony was not known.

Breeding success in the six years varied to some extent so these are treated separately.

The number of young produced per pair in the study plot are shown in table 1 together with an estimte of the total production of fledged young in each year in the whole colony.

Table 1. Hatching and fledging success of Black-headed Gulls in a study plot on Banks Marsh, 1968-73. Note: data for 1968 have been calculated from observations of a series of nests across the gullery, and not the study plot of 1969-73.

	Estimated no. pairs studied in plot	Total no. eggs laid (incl. replacements)	Total eggs hatched	% hatched
1968	337	1841	498	27.1
1969	708	3166	1082	34.2
1970	466	1109	850	76.6
1971	743	2616	1043	39.9
1972	673	1743	1112	63.7
1973	598	2733	922	33.7
Totals	3525	13208	5507	41.6

Mean no. hatched per pair	Estimated no. fledged	% young fledged	Mean no. young fledged per pair	Estimated minimum no. young fledged in whole colony
1.48	341	68.3	1.01	1800
1.53	801	74.1	1.13	1800
1.82	574	67.4	1.22	2400
1.40	537	51.3	0.72	2500
1.65	655	58.9	0.97	3800
1.44	463	50.2	0.77	5500
1.54	3371	61.1	0.96	17800

It will be apparent from this table that each pair of gulls produces on average up to six eggs per season as a consequence of the loss of the earlier eggs laid. In general, replacements in this colony are produced following losses up to early June of clutches which are less than about half-incubated. Replacements are normally laid six to twelve days after the date of loss and pairs which regularly lose eggs to humans or the tide replaced up to four clutches in one season either in or by the original nest.

Two factors have been responsible for the majority of losses of eggs (see table 2). In 1968-9 hatching success was low due to widespread egg collection but from 1970 a wardening scheme greatly reduced these losses. In 1969, 1971 and 1973 and, to a lesser extent, in 1968 tidal flooding accounted for huge losses whereas there were relatively few losses to this cause in other seasons. The percentage of eggs which failed to hatch due to infertility (no embryo development visible) or death of the embryo has increased during the study (1.5% in 1968, 2.4% in 1969, 10.0% in 1970, 5.2% in 1971, 13.0% in 1972 and 6.3% in 1973). The reason for this is not known.

Fledging success in semi-nidifugous species nesting in moderately thick cover is difficult to follow. In marram-grass *Ammophila arenaria* Patterson (1965) found between 50% and 90% of ringed Black-headed Gull chicks which he knew to be alive. In nettles *Urtica dioica*

Table 2. Causes of failure of Black-headed Gull eggs to hatch on Banks Marsh, 1968-73.

		Incubated to full term			Predated			
	Total lost	No. develop-ment	Dead embryo	Died in hatching	Avian	Human	Flooded	Not known
1968	1343	17	0	3	34	380	438	471
1969	2084	30	2	17	41	297	961	736
1970	259	14	4	8	11	56	42	124
1971	1573	51	9	21	19	19	915	539
1972	631	46	17	19	12	20	71	446
1973	1811	81	18	14	38	9	1137	514
Totals	7701	239	50	82	155	781	3564	2830

the proportion found varied from 10% to 80% depending upon the age of the chicks. Brown (1967) had similar difficulties with the young Herring and Lesser Black-backed Gulls on Walney. To give as accurate an estimate as possible three methods were employed:

1. Before the flight-feathers are well-developed the chicks usually remained within 30-40 metres of the nest site. This was partly due to choice but partly due to the large creeks which dissect the colony into several sections (though chicks occasionally swim across these they generally return within a few minutes). At each visit the study plot was searched, section by section, and the young counted. On some visits not all the sections were counted and so counts from each section were kept separately. This was, in essence, similar to the method suggested by Nisbet and Drury (1972) for studying fledging success in terns where the chicks on the study plot are isolated from the rest of the colony by a low fence. In this case the deep creeks act as a barrier until the chicks are almost fledged.

2. As a check to this method in 1972 the chicks on two large parts of the study plot were marked with plastic numbered rings. This showed that 40% of young between three and eight days old were not found on any census, whilst only 10-15% of the older young escaped capture. The estimate of fledging success obtained in 1972 (59%) using the direct searching method (1) was about 5% below the success level observed from the marked chicks (64%). Observations on the marked chicks confirmed that only a small minority leave their natal segment of marsh as only two out of 378 were seen off the plots, one on the other side of a creek and the other on the mudflats of Banks Bay.

3. Counting fledged gulls on the mudflats linked with the ringing (with British Trust for Ornithology rings) of near-fledged gulls on the mudflats and wider creeks gave results 30-60% lower than those obtained from the above methods.

Fledging success decreased during the study (table 1) inasmuch as the last three years had a lower success than the preceeding three years, but the reasons for this are not obvious. A few chicks were killed by other Black-headed Gulls (though cannibalism does not occur to the extent that it does in larger gulls (see Parsons 1971)), six were recorded taken by Carrion Crows *Corvus corone*, 40 drowned, and most died with no obvious cause though starvation, disease and the effects of heavy rain were certainly responsible for some. In 1971 many deaths were caused by one or more foxes *Vulpes vulpes* which also took a few young in 1972; in 1973 a feral mink *Mustella vison* killed at least 78 chicks in five nights before it disappeared and the increased numbers of Herring and Lesser Black-backed Gulls (which increased from 2 pairs in 1972 to 32 pairs in 1973) took many.

In 1972 when the survival of young was followed in detail, most of the chick losses occurred in the first few days after hatching (figure 4) when the small chicks are perhaps most vulnerable to predators. Similarly, Brown (1967) reported that all chicks seen to be taken by Herring and Lesser Black-backed Gulls were estimated to be less than a week old.

Effects of Laying Date on Mean Clutch Size and Breeding Success

Almost 80% of clutches (excluding replacements) were started between 28 April and 11 May, a little earlier than Goodbody (1955) found in three Scottish colonies. Clutch size was highest

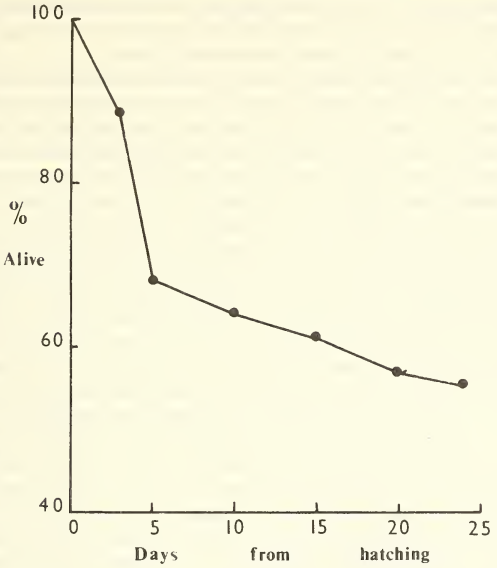


Fig. 4. The survival of marked Black-headed Gull *Larus ridibundus* chicks on Banks Marsh in 1972.

at the beginning of the breeding season and decreased thereafter (see table 3). Hatching success was highest from clutches laid early and decreased later in the season. This accords with the pattern observed in many species (reviewed by Lack 1966 and 1968) though Harris (1969) observed an increase in nesting success with later laying within a single season in the Herring Gull.

The effects of flooding of most nests in early May (an event which occurred about every other year) stopped or pushed back the nesting period, reduced clutch size and reduced hatching success. In 1971 and 1973, 518 first-clutches averaged 2.4 eggs whilst within a

Table 3. Clutch size, hatching and fledging success in relation to date of laying of first egg in Black-headed Gulls on Banks Marsh. Data taken from 1970 and 1972 when there were few losses to flooding or egg collection.

Date of laying	No. clutches	Mean size of clutch	% clutches started	% eggs hatched	Estimated % young fledged
Before 25 April	8	2.62	1.1	81.0	82.3
26–30 April	117	2.88	14.8	87.0	71.4
1–5 May	382	2.61	48.3	77.3	77.3
6–10 May	169	2.33	21.4	41.9	57.1
11–15 May	54	2.13	6.8	41.7	22.9
16–20 May	27	1.89	3.4	41.1	14.3
21–25 May	16	1.75	2.0	25.0	14.3
26–30 May	4	1.75	0.5	0.0	–
31 May – 4 June	6	1.84	0.8	9.1	0.0
5–9 June	4	2.00	0.5	0.0	–
10–14 June	3	1.33	0.4	0.0	–
15–19 June	1	2.00	0.1	0.0	–

fortnight of the losses in early May, 587 replacements and new nests averaged 2.1 eggs. Had the original clutches not been lost at least 70% of eggs would have been expected to hatch (table 3) whilst instead only 64% of the replacements hatched.

Fledging rates were also highest from the early-hatched young so it is even more important that the replacements be laid as quickly as possible after flooding or mass collection. On 4 May 1973 the tide had rolled most eggs out of the nests and the adults rapidly devoured the eggs so that within about five hours of the flooding only seven intact eggs remained from the original hundreds; possibly the females would utilize this protein in the formation of the new clutch though it was difficult to believe that this was intentional.

In 1973, 1,844 first-clutch eggs and 1,613 replacement-clutch eggs were weighed. There was no significant difference between the weights of eggs in the three main clutch sizes (one, two and three eggs) but the first-clutch eggs were significantly heavier, 36.9g (S.D. 3.65) then the replacements, 34.0g (S.D. 3.41) ($p<0.001$). Parsons (1972) found that the smaller eggs produced by Herring Gulls often contained yolks which were smaller than those in the larger eggs, and hence the young from smaller eggs were smaller than those from larger eggs. In 1973, 19 just-hatched young from first clutches had a mean weight of 23.3g (S.D. 2.84) compared with 84 young from replacements which averaged 22.0g (S.D. 3.49). Though these are not significant ($p>0.05$), it is possible that generally young from replacements were lighter in weight than those from first clutches and this may possibly cause or contribute to the lower fledging success of replacements. It is possible also that there are more predators later in the breeding season or that parental behaviour might change making it easier for predators to take eggs or young. The relationship between laying date and mean clutch size, hatching and fledging success has been recorded in many species and the effects of flooding by the spring tides is not just confined to the Black-headed Gull on Banks Marsh but has been found in the Oystercatcher *Haematopus ostralegus* (Greenhalgh 1969), Common Tern *S. hirundo* (Greenhalgh 1974b) and the Redshank *Tringa totanus* (Greenhalgh and Hale, work in progress).

Effects of Clutch Size on Hatching Success

Forty-two percent of eggs from c/3 nests and 50.1% of eggs from c/2 nests hatched compared with only 14% from one-egg nests. Thus it appears that the commonest clutch sizes (two or three) had the highest hatching success and hatching success was similar in them. It is probable that birds laying clutches of one are less effective in incubation: Beer (1961) has shown that such birds make a greater number of settling movements than those with clutches of two and three. This may result in the death of the embryo because of inadequate incubation or make the clutch more vulnerable to predators.

Nest Position and Nesting Success

Unlike dune, moorland, fenland and island Black-headed Gull colonies, the nests in this colony were not scattered in a fairly uniform or clumped distribution over the marsh but were concentrated by the edges of salt-marsh creeks, such edges being up to 1m. higher than the surrounding flat saltmarsh. In 1973 on one section of saltmarsh 551 out of 780 nests (70.6%) were classed as 'ridge', being within 5m. of a creek. Nests of Oystercatcher (Greenhalgh 1969), Common Tern (Greenhalgh 1974b) when not excluded from such raised areas by the dominant gulls, and Redshanks were similarly distributed. Figure 3 (on page 124 of Greenhalgh 1974b) shows this characteristic pattern.

These ridges offer great protection against flooding for, in 1973, on the study plot 52.6% of eggs on the ridges hatched compared with 8.3% on the lower marsh. The only 'non-ridge' pairs which were successful were those which had laid immediately after the first flooding in hastily repaired nests, nested on raised parts of the marsh away from the channel ridges, or which had constructed nests bulky enough to escape being washed away (one pair built a nest 580mm. high with a base diameter of 3.4m.).

Discussion

In the study plot during 1968-73 an average of 3.74 eggs were laid per pair (including replacements), 1.54 young per pair have hatched and from these a mean of 0.96 young per pair

fledged (table 1). Patterson (1965) and Lack (1968) state that the mortality from fledging to first breeding (most at two years) is about 38% and then the adult mortality is about 18%. These estimates have two main limitations: firstly, the standard errors are large, at about 5%, and secondly they are based on data collected since the inception of the British bird-ringing scheme and it is likely that mortality rates have decreased in recent years owing to more food, less persecution etc. Thus they must be treated as minimal estimates. As yet the results from intensive ringing in the Banks Marsh colony are not sufficient for reanalysis so at a later date it may be necessary to revise this section. It seems useful, however, despite the possible inaccuracy of the post-fledging mortality figure, to combine all the above data to make a tentative investigation into the increase of this gullery.

For the years prior to this study the population increase appeared to exceed that expected from the breeding output of the population, i.e. the population would be expected to have increased from 1,000 pairs in 1965 to 1,300-1,400 in 1968; instead it increased to 1,800 pairs. The 1970 population of about 2,000 was close to the expected 2,100 pairs. Since then the colony has increased to a far greater extent than was expected from the data on fledging and mortality: in 1971 expected 2,300, observed 3,500; in 1972 expected 3,520, observed 4,000; in 1973 expected 4,350, observed 7,200. These data are plotted in figure 2.

Harris (1970) has published much higher survival rates for Herring and Lesser Black-backed Gulls than those of Patterson (1965) and Lack (1968) suggesting that population increases of at least 20% can be attributed to the breeding output of the colony without immigration. Furthermore, the Needs Oar, Hampshire Black-headed Gull colony increased from 1,130 pairs in 1957 to 20,000 pairs in 1971-2 (Taverner 1966 and *Hants. Bird Rept.* for 1972), an average rate of 22.7% per annum, whilst its breeding output was up to twice as high as the Banks Marsh colony: in 1962 the 1,000 pairs reared 2,000 young (Taverner 1966). However, an examination of the Banks marsh colony data reveals a much higher rate of increase than this. Overall (1954-73) the colony has increased by an average rate of 33.8% per annum, whilst in the period of greatest increase (1964-73) the rate was 37.9%. Rates of increase of less than 30% would have resulted in a much smaller colony and if the observed rate of increase had been soley due to breeding output, then the average post-juvenile (including first and second year and adult) mortality rate would have been extremely small: less than 5%. There can be no doubt therefore, that to some extent the increase of the colony from its initial founding and through the phase of explosive increase has been due in part to birds raised at other colonies settling in the area. Brown (1967) and Greenhalgh (1974a) came to a similar conclusion regarding the massive increase of Herring and Lesser Black-backed Gulls in the Walney and Bowland colonies.

Only two birds ringed elsewhere (both as pulli) have been recorded in the Banks Marsh colony (young ringed in Yorkshire and Hampshire in 1960 and 1967 respectively were found breeding in the colony in 1973) and it is possible that birds from some badly persecuted colonies are still joining the Banks Marsh colony.

Regardless of whether the Banks Marsh colony has increased by its own reproductive capacity or partly by immigration, the question remains why the colony has increased so dramatically. To human eyes, Banks Marsh appears a suitable area — a safe breeding site on one of Britain's largest saltmarshes and close to large estuary and farmland feeding areas. Even if other conditions had been suitable, the actual colony could not have been founded earlier as the marsh has been in existence only since about 1934 in its present form (Gresswell 1953). Before then the Black-headed Gull nests were heavily persecuted at other colonies, with the consequence that most colonies were small or had to move location rather in the manner of some terns in an attempt to escape persecution. The saltmarsh has allowed them to escape much persecution and now they are legally protected and the colony wardened. Reduction of persecution by man has thus contributed to the increase of this colony, the factor which many authors (e.g. Coulson 1963) have considered to be the main one producing the increases of so many species of gulls.

However, even a safe nesting area is of little consequence if food is limited. There has been general agreement that food has increased for the larger gulls (e.g. Brown 1967, Harris 1970) but most workers have concentrated on food directly supplied by man in the form of fish

waste, garbage etc. These sources of food cannot be responsible for the increases in northwest England as relatively few gulls use tips or fish docks (Greenhalgh 1974a). The Ribble Black-headed Gull population gets most of its food in the fields (especially worms Lumbricidae and diptera larvae) or on the shore (the bivalve *Macoma balthica* and crab *Carcinus maenas* are examples). The northwest England coastal plain and the shore as we know it are of fairly recent origin (Ashton 1920, Gresswell 1953). Most of the saltmarshes were not in existence in 1800, that at Banks not until the 1930's. The towns and villages and their surrounding farmlands were mostly on the boulder clay above 30m. and the population on the lower plain was very sparse up to the last century. Much of the coastal plain was covered with dense Birch scrub or heath, or was swamp or bog, and it was not until the 19th century when most were drained and cleared to produce large areas of farmland (Ashton 1920, Gresswell 1953, Porter 1876) that the area would have produced a good feeding habitat for gulls.

The seashores were also far more sandy than at present. Without the saltmarshes, the vast amounts of organic debris vital to the productivity of an estuary (Odum 1961) would have been lacking from the Ribble estuary ecosystem. Also the large quantities of organic sewage which now enrich the estuary would have been lacking. In time gone by, a lower level of organic material in the rivers would have probably meant much smaller invertebrate populations than now occur. Thus, although it is impossible to prove, it seems fair to assume that the expansion, both in numbers and range, of the human population has resulted in a large increase of food for these gulls.

Most other very large Black-headed Gull colonies in Britain are within easy reach of estuaries, farmland and areas of high human population. In many areas e.g. Poole and Chichester Harbours, the Thames and Essex marshes, Solway, Severn and Bristol Channel and Ravenglass in northwest England, colonies appear to have increased in similar ways. Possibly the factors which appear to make Banks Marsh such an attractive area to gulls may be typical of many other places.

Summary

On Banks Marsh, Lancashire, a Black-headed Gull *Larus ridibundus* colony was founded in the early 1950's and increased to 7,200 pairs in 1973. During the six years of this study (1968-73) an average of 3.74 eggs have been laid per pair (including replacements) and of these 1.54 young per pair hatched and 0.96 young have been raised to fledging. Clutch size was highest at the beginning of the season whilst a higher proportion of eggs laid at this time hatched than later in the season. Nests with clutches of two and three were more successful than those with one and those nests situated on raised edges to saltmarsh creeks were more successful than those away from the creeks. These factors are discussed with special reference to human predation and flooding of the colony by spring tides.

It is clear from the rates of production in this colony and data on mortality from published sources that the rate of growth of the colony (over 30% per annum) cannot be explained by just the colony's own production. Some of the increase must be due to birds coming from other colonies, possibly as a consequence of persecution, and it is proposed that the increase of this and possibly other successful gulleries in northwest England are due to:

1. The formation of colonies in areas little affected by human predation.
2. Agricultural development of the coastal plain during the 19th century, which replaced poor feeding areas by rich ones.
3. An increase of organic detritus in the estuaries and inshore waters from (a) increased saltmarshes and (b) sewage etc. from the increased coastal human population, resulting in an increased invertebrate and fish population on which the gulls feed.
4. Immigration from less favourable areas.

Whether this hypothesis will explain the situation over the rest of the gulls' range remains to be seen.

Acknowledgements

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Most especially I would express my gratitude to Dr. M. P. Harris for the work he has done in making earlier manuscripts more concise and readable.

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FIELD NOTES

Firecrest in the Sheffield Area

Whilst counting the wildfowl on Broomhead Reservoir near Stocksbridge on 26th October 1974, one of us (DH) noted a small passerine feeding in a nearby Willow *(Salix caprea)* at the water's edge. It was first dismissed as a Goldcrest *(Regulus regulus)* but a closer examination revealed a somewhat unusual head pattern for that species. From a distance of only five yards the following plumage features were noted:

> Size similar to that of a Goldcrest but rather more brightly coloured. A prominent yellow-orange stripe extended through the centre of the crown almost to the base of the bill. On either side of this was a broad black band which contrasted sharply with two prominent broad white supercilia. A narrow black stripe ran through each eye. Elsewhere on the body the upperparts were yellow-green in colour with rusty or bronze patches on the shoulders and nape. The underparts were more lightly coloured and a double white wing bar was visible on each wing.

After feeding for a short time in the willows the bird flew further along the reservoir margin to another group of willows. No precise note was taken of the call.

DH, satisfied that the bird was indeed a male Firecrest *(Regulus ignicapillus)* returned to DG and A&B. Kidd who had been similarly engaged in counting wildfowl further along the reservoir. The four observers returned to the point where the bird had last been seen but were at first unable to locate it. After a period of fruitless searching it was finally found, this time in a Hawthorn *(Crataegus monogyna)* shrub by the roadside. The single — occasionally di-syllabic — 'sit' or 'zit' call proved most distinctive and helped to locate the bird as it moved to a nearby Pine. Further views obtained of the characteristic head colouration and brightly coloured body-parts confirmed the original identification.

The Firecrest eventually moved into a dense young Sitka Spruce plantation and although seen briefly in a low-growing, roadside conifer, was soon lost from sight. The clear 'zit' call enabled the bird's position within the plantation to be pin-pointed but that too eventually ceased.

Further searches of the area on the same and several following days failed to locate the bird again. It is perhaps of interest to note that a second Firecrest was reported on November 17th in the Porter Valley, a distance of seven miles from the first locality. Another sighting of this species was also reported from Combs Reservoir, near Chapel en le Frith, in North Derbyshire on 23rd November (present to year end). If accepted by the YNU Rarities Committee, the two Yorkshire sightings will be only the first and second reports of this species within the Sheffield region since 1878.

D. Herringshaw and D. Gosney

Polydesmid Millipedes new to Mid-West Yorkshire

Amongst a collection of millipedes which I made in Sleets Gill, Kilnsey, Yorkshire (34/960693), 29/4/73 were specimens of *Brachydesmus superus* Latzel and *Polydesmus denticulatus* C. L. Koch, neither of which have been previously recorded for vice-county 64.

The Polydesmidae are distinguished by their 'flat backs' and the metazonites which are produced into dorso-lateral keels which are level with the flat dorsal surface.

Brachydesmus superus Latzel 14 specimens (6♂♂; 4♀♀; 4 juveniles) from beneath stones, soil, calcareous loam.

Polydesmus denticulatus C. L. Koch Two specimens, both males, from beneath a stone.

I am indebted to Dr. J. Gordon Blower, University of Manchester for identifying the specimens and to Dr. C. Fairhurst, University of Salford for pointing out that the finds constitute new vice-county records.

Douglas T. Richardson

RECENT INVESTIGATION INTO THE DISTRIBUTION OF HARVEST MICE IN YORKSHIRE

TONY FRENCH

The survey which this paper describes is intended to complement work at present being undertaken by Mr. C. A. Howes of Doncaster Museum and Mr. Stephen Harris of the Mammal Society. It concerns the status and distribution of the Harvest Mouse, *Micromys minutus*. The aim of the survey was to establish if and where Harvest Mice were present in southern Yorkshire by finding their abandoned summer nests.

The traditional view of Harvest Mouse distribution is that the species is 'Found mainly in southern and eastern parts of England' and 'becoming increasingly scarce, even rare' (B.B.C. 1975), 'very rare indeed' (B.B.C. 1974) and 'nowhere common' (Lawrence and Brown 1973). Yet nests have been found in many localities in the Doncaster and Selby districts and in one of these at least there was sufficient evidence to prove that Harvest Mice were common in that area. The way in which the survey came about and progressed is outlined below. It will be seen that it concerns only the two areas of Selby and Doncaster; this is because (i) the Selby area was chosen after Harvest Mice were shown to be present in suitable localities near Doncaster, because it is over twenty miles to the north and at the northern limit of the mouse's proven range at that time, so a good base for collecting new records; and (ii) it quickly became apparent that the mouse was so widely distributed in the Selby district that the aim of the survey had been amply satisfied. Further investigations with the purpose of proving if and where Harvest Mice occur must take place further north still. The survey must thus be regarded as merely preliminary to studies bound to follow.

Though nests had occasionally been found by Mr. Bunting of Thorne up to 1959 (Howes 1973a), no direct evidence other than this of Harvest Mice in Yorkshire came until three skulls were discovered in owl pellets collected on Thorne Moors (Howes 1973b, 1975). This led the writer, in his capacity as recorder of mammals at Potteric Carr Nature Reserve near Doncaster, to instigate a search for evidence that Harvest Mice were present on the Doncaster Carrs. On 20th October 1974 Mr. Stephen Harris of the Mammal Society visited the reserve and discovered two nests, one in Cocksfoot grass, the other in *Phragmites*. Two weeks later, Mammal Society members visited the reserve and discovered fourteen nests in an area small enough for their inhabitants to be afforded the status of 'common' in that area. Mr. Andrew Thompson of Thorne has also discovered Harvest Mice remains in pellets collected in south Yorkshire.

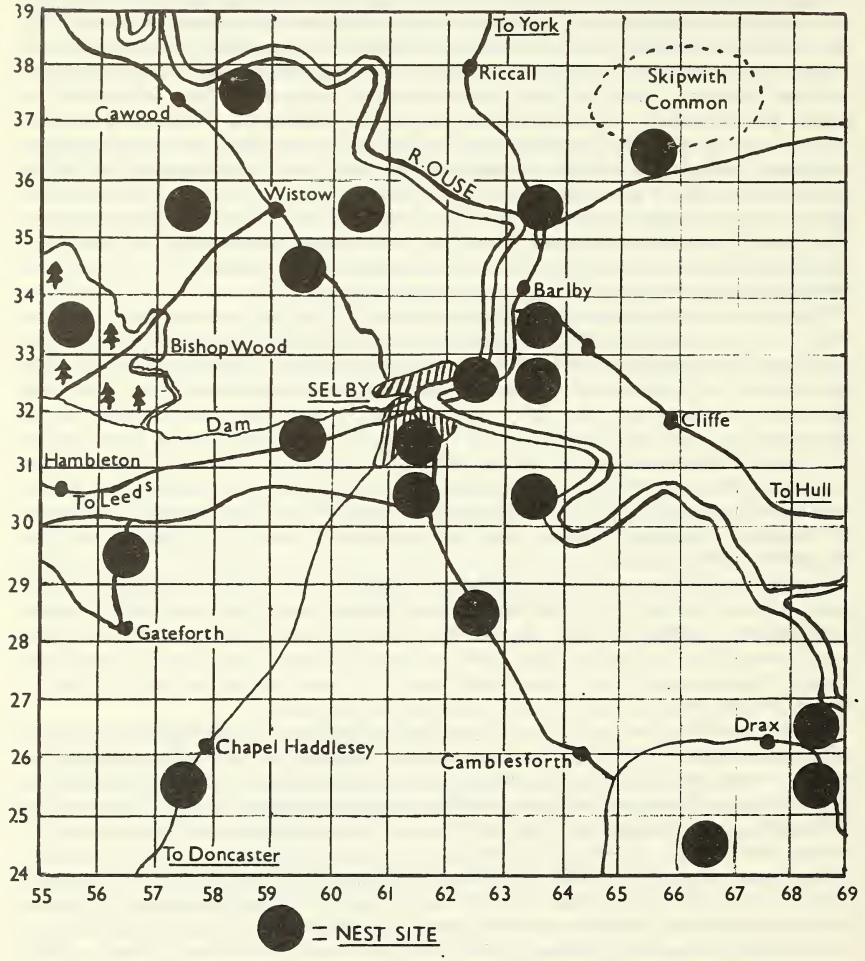
Thus encouraged, the writer searched other suitable sites in the Doncaster District; each yielded at least one nest. The sites were Thorpe Marsh; Castle Hills, Scawthorpe; Willow Garth, Arksey; and Denaby Ings. All nests were in the stems of *Phalaris arundinacea*, Reed Grass, except those at Denaby which were in *Glyceria fluitans*, Flote Grass. The six nests found at Denaby in one of the few accessible stands of *Glyceria* suggest nests in other parts of the Ings and thus that Harvest Mice may be not uncommon here.

A search was then mounted in the Selby district. Given the traditional beliefs as to the distribution of Harvest Mice the results were quite startling, but it is becoming clear that they were wholly predictable from subsequent records. The localities where nests have been discovered are shown on the map, which is merely intended to show what present investigations are revealing; that Harvest Mice are widely distributed in certain areas of southern Yorkshire.

Most nests in the Selby district were found in *Phalaris*. It is easy to search; erect stands persist in many places throughout the winter and it is easy to find in the low-lying Selby areas with its many ditches. Ditches with sturdy growths of *Phalaris* on their banks are very good sites to search; many have produced a nest. Nests are found in Monocotyledonous plants generally, however, and there is little doubt that if nests are in *Phalaris* they will be in other plants in the district. Two of the Selby nests were found in Cocksfoot; this was searched because there was no *Phalaris* in the vicinity.

A total of twenty nest sites was found, after which it was considered that the aim of the

Harvest Mouse Nest Sites in the Selby District, 1974.



The squares represent the 1Km grid, O/S map 105

survey was fulfilled and further searching at this date superfluous. No attempt has been made to estimate the status of the Selby mice. The beginning of 1975 brought with it a further step forward in Harvest Mice studies with the discovery by Mr. Stephen Harris of seven new localities in North Humberside and the first record for the old North Riding ('First record' refers specifically to the present national survey). The re-assessment of the distribution and regional status of the Harvest Mouse in Britain by the present national survey (Harris 1974) to which this local survey has been intended as a contribution, is producing fascinating results. It is clear that the Harvest Mouse is not the elusive and rare creature it is supposed to be in Yorkshire; indeed the county seems to have good numbers, widely distributed, of Britain's smallest mammal.

In conclusion, I must thank Mr. Colin Howes for his encouragement, Mr. Stephen Harris (who is conducting the survey into the distribution of Harvest Mice in Britain on behalf of the Mammal Society) for his immense help, and Mr. Arthur Gilpin for his interest and advice.

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DIEBACK OF TREES IN NORTH HUMBERSIDE WITH SPECIAL REFERENCE TO OAK

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It has been claimed that many hedgerow trees on North Humberside are dying back at a rapid rate. Whether or not this is so there are certainly many stag-headed trees, especially oak, in the area and early in 1974 we were asked by the North Humberside branch of the Council for Protection of Rural England to carry out a field survey and attempt to determine what is responsible for the condition.

According to Jones (1959), rapid dieback of oak has been reported from large areas of Europe at various times during the twentieth century. In the majority of cases death occurred after a succession of defoliations by insects followed by an attack on the lammas shoots by oak mildew *(Microsphaera alphitoides).* In some cases however it was believed that drought contributed to dieback. Jones *(loc. cit.)* also states that stag headedness is often a symptom of root rot and that root rot can be a result of changes in drainage brought about either by the blocking or the deepening of field drains. Exposure to a prolonged period of northerly winds during the growing season was considered by Young (1965) to have been largely responsible for the dieback of 20 year old trees in two plantations in northern Norfolk. In an age when hedgerows are often treated with scant respect and chemical sprays are widely used on farms it is also possible that ploughing close to hedgerows or herbicides are involved in dieback. Finally it is possible that many hedgerow trees are simply dying of old age.

In order to test these various hypotheses, two sites in the Plain of Holderness were chosen for the present investigation, one in intensively farmed country near Long Riston (Grid Reference TA127423) and the other on Beverley Westwoods, a large area of grazed common

west of Beverley. At the Long Riston site investigations were carried out in July on forty hedgerow trees and forty trees in a small plantation; on Beverley Westwoods about fifty trees growing around the edge of Burton Bushes, a small piece of woodland about 15 acres in area, were examined in September. The edge of Burton Bushes presents a park-like appearance and the majority of trees examined were more or less isolated and associated with herbaceous plants only.

Methods

At each site the girth of each tree at breast height was measured and a subjective assessment made of the proportion that was dead. At the Long Riston site evidence of an association between dieback and any particular environmental factor or agricultural practice was sought.

Samples of twigs were taken from healthy and dying trees at each site and tested for the presence of pathogenic organisms. In the laboratory, samples of bark, wood and leaves were surface sterilized in 10% Chloros solution for various periods of time and placed on both Nutrient Agar and Potato Dextrose Agar. In a number of the agar plates bacteria interfered with fungal growth so in subsequent work an antibiotic medium consisting of 50 units/ml of Penicillin and 100 units per ml of Streptomycin were incorporated into the agar. Admittedly the antibiotics could have killed the organism responsible for dieback of the trees but we are not aware of any reports of bacteria being responsible for such symptoms in oak.

Results

Of the organisms which were observed on the trees or which grew on the culture plates only *Microphaera alphitoides* is known to be a serious parasite. On the trees examined infestation by mildew did not appear to be heavy and, at the Long Riston site, trees in the copse were infected as were the isolated trees. It is considered unlikely therefore that mildew is responsible for dieback. No fruiting bodies of any of the larger Basidiomycetes known to be lethal to trees were seen on or near any of the trees.

In Fig. 1 the relationship between the subjective estimate of percentage dieback and girth for isolated trees and those in the copse near Long Riston is presented. A similar relationship for the trees around the periphery of Burton Bushes is shown. For isolated trees there is an inverse relationship between girth and percentage dieback at both sites, i.e. the greater the percentage dieback the smaller the girth. The mean girth of the trees in the copse at Long Riston was lower than that of isolated trees. Of the isolated trees at Long Riston, 50% showed dieback of 50% or more, while at the Beverley Westwood site only 12% showed dieback of 50% or more.

In Table 1 the mean percentage dieback of trees isolated on the northern, southern, eastern and western sides of Burton Bushes is presented together with that for an isolated group of trees to the south of Burton Bushes. It is noteworthy that the mean percentage dieback of the trees on the southern side and of the separate group on the southern side is substantially greater than that of trees on the remaining three sides of Burton Bushes. Of those on the southern side the worse affected branches were on the southern and western sides of nine of the eleven trees, but there was no marked orientation of the worse affected branches in the southern group.

Table 1

Mean girth and mean percentage dieback of trees isolated on the northern, southern, eastern and western sides of Burton Bushes and of a group to the south of Burton Bushes.

Position	*Number of trees*	*Mean girth (metres)*	*Mean % dieback*
North	5	3.17	8
West	11	3.03	8
East	13	2.98	15
South	11	2.90	28
Southern Group	14	2.54	30



Fig. 1. The relationship between percentage dieback and girth of oak at Long Riston and Beverley Westwood

● = isolated trees
○ = trees in a copse

At the Long Riston site it was noted that some Ash trees in the hedgerows were exhibiting dieback, but no measurements were taken. About three miles to the west of Beverley Westwoods, on the chalk, a copse of Ash was found in which some of the trees were exhibiting dieback. Measurements of girth and estimates of percentage dieback were made on 17 trees and again an inverse relationship between girth and % dieback was found. None of the trees showed a degree of dieback in excess of 20%.

Discussion and Conclusions

If it is accepted that girth is a rough estimate of age it seems unlikely that isolated trees at the two sites are dying from old age, for if this were the case a positive relationship between percentage dieback and girth would be expected for the smaller trees at least. It does seem likely however that the mean age of the trees in the copse at the Long Riston site is less than that of the hedgerow trees. Three explanations of the inverse relationship between percentage dieback and girth for isolated trees at the two sites can be put forward.

1. The trees showing greater percentage dieback are younger.
2. Those showing greater percentage dieback have been growing in positions of greater environmental strees.
3. The trees showing greater percentage dieback tend to have smaller girths because they are dying back. Such trees carry progressively less foliage and might be expected to put on progressively less secondary thickening.

Since all of the trees are quite large, with girths in excess of 1m, it seems unlikely that the smaller trees are more susceptible to dieback simply because they are younger. Progressive reduction in rate of secondary thickening is to be expected as the trees die back but an explanation of why some tres have died back more than others is still required. Since no lethal pathogens could be found it is considered that dieback is related to the degree of environmental stress.

At Burton Bushes, the trees on the south side showed a greater degree of dieback than those elsewhere (Table 1). There is no marked topographic variation around this piece of woodland and no reason for expecting the soil on the south side to be markedly different from that elsewhere. It is suggested therefore that, as in the woods investigated by Young (1965), wind is responsible for dieback and it is noteworthy that south west winds are common on North Humberside. Trees isolated in hedgerows would be expected to suffer particularly severely from wind and this greater exposure might be the reason why the hedgerow trees at Long Riston are showing a greater degree of dieback than those around Burton Bushes. The mean girth of the Burton Bushes trees is 2,89m and of the isolated trees at Long Riston 2.17m.

Since all of the trees investigated are quite large, conditions must have been satisfactory for growth over a considerable period of time. Young *(loc. cit.)* was able to date the onset of dieback from observations on growth rings but since no such information is available for the Long Riston and Burton Bushes sites it is not possible to give any indication of when dieback sarted. Jones (1959) states "Isolation of old trees by felling neighbours almost always causes them to become stag headed and die prematurely; the closer trees have been grown together the greater the risk". It is possible that the destruction of hedgerows and hedgerow trees on a large scale over the last decade or so has increased the degree of exposure to an extent sufficient to promote severe dieback of those that remain, as at Long Riston. The fact that the condition is also shown by Burton Bushes trees however suggests that exceptional climatic conditions at some time in the past might also be involved.

Acknowledgment

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References

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THE FLOWERING PLANTS OF SPURN POINT

EVA CRACKLES

The following list of vascular plants for the Spurn Bird Observatory area has been compiled from observations made by me between 1946 and 1974. Other authentic records for the same period have been included and the source of information indicated.

A particularly intensive examination of short turf and disturbed sand communities was made in 1954. At that time there were extensive areas of short turf and considerable stretches of intermittently disturbed sand, as along the site of the old railway.

With the advent of myxomatosis in 1954 and the consequent absence or severe reduction of rabbit grazing since that time, the vegetation of much of the peninsula has moved towards a climax with Sea Buckthorn predominating. The spread of *Hippophae rhamnoides* (Sea Buckthorn) has been accompanied by an equally remarkable spread of the alien *Montia perfoliata* (Claytonia), which has however been present on the peninsula since at least the beginning of this century. Short turf areas have decreased drastically in extent and have at times been maintained by treading and not by grazing, although rabbits are now present. Inevitably species characteristic of both short turf and open communities have decreased greatly in frequency; some may have become extinct or nearly so.

Other changes have occurred. The tremendous increase in the number of visitors and therefore of foot pressure has resulted in the rapid spread of some species e.g. *Bellis perennis* (Daisy) and *Plantago lanceolata* (Ribwort). The build up of *Spartina* on the Kilnsea Clays has brought about interesting changes on the river side, particularly in the Kilnsea Warren area. A salt marsh is building up on the edge of the *Spartina* and changes in conditions on the sandy shore are accompanied by changes in the vegetation. Very recently there has been a dramatic loss of land on the seaward side of Kilnsea Warren due to erosion by the sea; a bomb crater with its marsh and aquatic flora has completely disappeared. Land drainage operations, carried out north of the reserve in 1973, resulted in the loss of another pond and adjacent marsh. The resulting extensive denuded area was covered in1974 by an abundance of *Spergularia marina* (Sea Spurrey) which is thought to have developed from dormant seed, whilst a new drain contained *Ruppia maritima* (Tassel Pondweed).

For a number of years botanists have found the 'canal' and its banks to be of particular interest. The 'canal' was cut a year after the severe flooding of 1st February, 1953 and at first both the water in the 'canal' and the banks were completely devoid of vegetation. A fascinating process of colonisation followed, which included the arrival in quantity of two rare species, *Carex extensa* (Long-bracted Sedge) and *Juncus maritimus* (Sea Rush). By 1970 the 'canal' banks were less floristically rich than in the earlier stages of succession; some species are probably doomed to disappear and have already diminished in frequency.

The large number of species of vascular plants recorded for Spurn is remarkable when one considers the small acreage involved, and this reflects the variety of habitats. Two species, *Trifolium suffocatum* (Suffocated Clover) and *Parapholis incurva*, are at their absolute northern limit here.

Key to List of Species

An asterisk indicates that a species has been recorded in the last ten years; this documentation may be incomplete.

Some information concerning the status of species in the Spurn area and in Yorkshire is given; al = alien; esc. = garden escape; Y = only record for Yorkshire; E.Y. = only record for E. Yorks; R = rare in E. Yorks. i.e. under six records; s.t. = species more or less restricted to short turf and therefore now scarce; o = species of open communities i.e. where bare sand is present and therefore requiring a sandy area which is disturbed but not too frequently. Species more or less restricted to particular localities in the Spurn Bird Observatory area are noted thus; c = 'canal'; n = other areas north of the Y.N.T. reserve;

w = Kilnsea warren; a = arable in warren; d_1 = dunes between cottage and 'narrow neck'; c.b. = chalk bank area; l.h. = light house area; l.b.c. = near old life boat cottages; p.c. = point camp; s.s. = sea-shore and r.s. = river shore.

A record is dated if there is reason to think the species may not have persisted.

Order and nomenclature are as in Dandy's *List of British Vascular Plants* (1958) where applicable.

LIST OF SPECIES

Equisetum arvense L. (Common Horsetail)*
Phyllitis scolopendrium (L.) Newm. (Hart's-tongue Fern)* w
Dryopteris filix-mas (L.) Schott (Male Fern)* p.c.
Ranunculus acris L. (Meadow Buttercup)*
R. repens L. (Creeping Buttercup)*
R. bulbosus L. (Bulbous Buttercup)*
R. sardous Crantz (Hairy Buttercup)* c
R. sceleratus L. (Celery-leaved Crowfoot)*
R. baudotii Godr. (Water Crowfoot)* R; c, w
Aquilegia vulgaris L. (Columbine)* esc., w
Thalictrum flavum L. (Common Meadow Rue)* d_1
Papaver rhoeas L. (Field Poppy)
P. somniferum L. (Opium Poppy) al; R; n, 1961
Fumaria officinalis L. (Common Fumitory) a
Brassica nigra (L.) Koch (Black Mustard)
Sinapis arvensis L. (Charlock) a
S. alba L. (White Mustard)*
Diplotaxis muralis (L.) DC. (Wall Rocket)* al
D.tenuifolia (L.) DC. (Perennial Wall Rocket)* R; p.c.
Raphanus raphanistrum L. (Wild Radish)* w
Cakile maritima Scop. (Sea Rocket)* o; s.s., r.s.
Coronopus squamatus (Forsk.) Aschers. (Swine-cress)* n
Cardaria draba (L.) Desv. (Hoary Cress)* al
Capsella bursa-pastoris (L.) Medic. (Shepherd's Purse)*
Cochlearia officinalis L. (Common Scurvy-grass)*
C. anglica L. (Long-leaved Scurvy-grass), 1958
Lobularia maritima (L.) Desv. (Sweet Alison) al; E.Y.; l.b.c., 1964
Erophila verna (L.) Chevall. (Whitlow Grass)* s.t.
Armoracia rusticana Gaertn., Mey. & Scherb. (Horse-radish)
Barbarea vulgaris R. Br. (Yellow Rocket)*
Hesperis matronalis L. (Dame's Violet)*
Sisymbrium officinale (L.) Scop. (Hedge Mustard)
S. orientale L. (Eastern Rocket) al; w, 1949
S. altissimum L. (Tall Rocket)* al; w
Reseda luteola L. (Dyer's Rocket)*
Viola canina L. subsp. *canina* (Heath Violet)* R; o; n.n., d_1
V. tricolor L. subsp. *curtisii* (E. Forst.) Syme (Wild Pansy)*
V. arvensis Murr. (Field Pansy) a
Tamarix sp. (Tamarisk)* Introduced? p.c.
Silene vulgaris (Moench) Garcke (Bladder Campion)* d_1
S. noctiflora L. (Night-flowering Catchfly) a
S. dioica (L.) Clairv. (Red Campion)* r.s., 1971
S. alba (Mill.) E.H.L. Krause (White Campion)*
Cerastium tomentosum L. (Snow-in-Summer)* esc.; l.h.
C. holosteoides Fr. (Common Mouse-ear Chickweed)*
C. glomeratum Thuill. (Sticky Mouse-ear Chickweed)* s.t., o
C. atrovirens Bab. (Dark-green Mouse-ear Chickweed)* R; s.t., o

C. semidecandrum L. (Little Mouse-ear Chickweed)* s.t., o
Stellaria media (L.) Vill. (Chickweed)*
Sagina maritima Don (Sea Pearlwort)* R; c.b., *Nat.* 1970, 131
Honkenya peploides (L.) Ehrh. (Sea Sandwort)* r.s.
Arenaria serpyllifolia L. (Thyme-leaved Sandwort)* s.t.
A. leptoclados (Reichb.) Guss. (Lesser Thyme-leaved Sandwort)
Spergularia media (L.) C. Presl (Greater Sea Spurrey)* r.s.
S. marina (L.) Griseb. (Sea Spurrey)* n, c.b.
Montia perfoliata (Willd.) Howell (Claytonia)* al; R
Beta vulgaris L. subsp. *maritima* (L.) Thell. (Sea Beet)* r.s.
Atriplex littoralis L. (Shore Orache)* c
A. patula L. (Common Orache)*
A. hastata L. (Hastate Orache)* r.s.
Halimione portulacoides (L.) Aellen (Sea Purslane)*
Suaeda maritima (L.) Dumort. (Seablite)* c, c.b., r.s.
Salsola kali L. (Saltwort)* R; s.s., r.s.
Salicornia europaea L. (Marsh Samphire)* r.s., c.b.
Malva sylvestris L. (Common Mallow)*
Linum catharticum L. (Purging Flax)*
Geranium pratense L. (Meadow Cranesbill) w
G. dissectum L. (Cut-leaved Cranesbill)* a
G. molle L. (Dove's-foot Cranesbill)*
Erodium cicutarium (L.) L'Hérit. (Storksbill)* s.t., o
Acer pseudoplatanus L. (Sycamore)*
Ulex europaeus L. (Gorse)*
Ononis repens L. (Restharrow)*
Medicago sativa L. (Lucerne) al; c, 1963
M. lupulina L. (Black Medick)*
Melilotus altissima Thuill. (Tall Melilot)* al; n
Trifolium pratense L. (Red Clover)*
T. arvense L. (Hare's-foot Trefoil)* o
T. striatum L. (Soft Clover)* R; s.t.
T. scabrum L. (Rough Clover)* R; s.t.
T. suffocatum L. (Suffocated Clover)* Y; s.t.; w, *Nat.* 1946, 155; p.c., 1971
T. repens L. (White Clover)*
T. fragiferum L. (Strawberry Clover)* c, n
T. campestre Schreb. (Hop Trefoil)*
T. dubium Sibth. (Lesser Clover)*
T. micranthum Viv. (Slender Yellow Trefoil) R; o, *Nat.* 1946, 155
Lotus corniculatus L. (Birdsfoot-trefoil)*
L. tenuis Waldst. & Kit. ex Willd. (Slender Birdsfoot-trefoil)* c
Vicia hirsuta (L.) Gray (Hairy Tare)* d_1
V. tetrasperma (L.) Schreb. (Smooth Tare)* n, w
V. cracca L. (Tufted Vetch)*
V. sepium L. (Bush Vetch) n
V. sativa L. (Common Vetch) w
V. angustifolia L. (Narrow-leaved Vetch)* d_1
V. lathyroides L. (Spring Vetch)* R; s.t., o
Lathyrus pratensis L. (Meadow Vetchling)*
Filipendula ulmaria (L.) Maxim. (Meadow-sweet)*
Rubus fruticosus L. sensu lato (Bramble)*
Potentilla anserina L. (Silverweed)*
P. reptans L. (Cinquefoil)*
Agrimonia eupatoria L. (Agrimony)* d_1
Aphanes arvensis L. (Parsley Piert)* s.t.

Crataegus monogyna Jacq. (Hawthorn)*
Sedum album L. (White Stonecrop)* esc.; w
S. acre L. (Stonecrop)*
Hippophae rhamnoides L. (Sea Buckthorn)* R
Epilobium hirsutum L. (Great Hairy Willow-herb)*
E. parviflorum Schreb. (Small-flowered Hairy Willow-herb)*
Chamaenerion angustifolium (L.) Scop. (Rosebay Willow-herb)*
Myriophyllum spicatum L. (Spiked Water-milfoil)* c
Hedera helix L. (Ivy)* w
Eryngium maritimum L. (Sea Holly)* R; o
Anthriscus caucalis Bieb. (Bur Chervil)*
A. sylvestris (L.) Hoffm. (Cow Parsley)*
Torilis japonica (Houtt.) DC. (Upright Hedge-parsley)* n
T. nodosa (L.) Gaertn. (Knotted Hedge-parsley) a, 1946
Conium maculatum L. (Hemlock)*
Apium graveolens L. (Wild Celery)* n
A. nodiflorum (L.) Lag. (Fool's Watercress)* n
Petroselinum crispum (Mill.) Nyman (Parsley) esc.
Conopodium majus (Gouan) Loret (Earthnut)
Aegopodium podagraria L. (Ground Elder)* w
Oenanthe fistulosa L. (Water Dropwort)* n
Foeniculum vulgare Mill. (Fennel)*
Angelica sylvestris L. (Wild Angelica)*
Pastinaca sativa L. (Wild Parsnip)*
Heracleum sphondylium L. (Hogweed)*
Daucus carota L. (Wild Carrot)*
Euphorbia lathyrus L. (Caper Spurge) al; n, 1947
E. helioscopia L. (Sun Spurge) a, 1961
E. exigua L. (Dwarf Spurge) a
E. uralensis Fisch. ex Link, as *E. virgata* Waldst. & Kit.* al; R; d_1, first recorded 1948
Ricinus communis L (Castor Oil plant)*al; R; s.s.
Polygonum aviculare L. sensu lato (Knotgrass)
P. amphibium L. (Amphibious Bistort)* n
P. persicaria L. (Persicaria) a
P. lapathifolium L. (Pale Persicaria) a
P. convolvulus L. (Black Bindweed)* a
Rumex acetosella L. (Sheep's Sorrel)
R. acetosa L. (Sorrel)*
R. crispus L.(Curled Dock)*
R. obtusifolius L. (Broad-leaved Dock)
Urtica urens L. (Small Nettle) a, 1961
U. dioica L. (Stinging Nettle)*
Limonium vulgare Mill. (Sea Lavender)* c.b.
Armeria maritima (Mill.) Willd. (Sea Pink)* c.b.
Primula veris L.* p.c.
Anagallis arvensis L. (Scarlet Pimpernel)* o
Glaux maritima L. (Sea Milkwort)* c.b., c
Ligustrum vulgare L. (Privet)*
Vinca minor L. (Lesser Periwinkle)* esc.; w
V. major L. (Greater Periwinkle)* l.h.
Centaurium erythraea Rafn (Common Centaury)* c, w
Blackstonia perfoliata (L.) Huds. (Yellow-wort)* w, p.c.
Symphytum officinale sensu lato (Comfrey)*
Pentaglottis sempervirens (L.) Tausch (Alkanet) al
Lycopsis arvensis L. (Small Bugloss) a

Myosotis arvensis (L.) Hill (Common Forget-me-not)*
M. ramosissima Rochel (Early Forget-me-not)* s.t.
Convolvulus arvensis L. (Field Bindweed)*
Calystegia silvatica (Kit.) Griseb. (Large Bindweed)
Calystegia soldanella (L.) R. Br. (Sea Bindweed)* R; o; n.n., l.h.
Lycium halimifolium Mill. * Det. G. Nelson al; w
Solanum dulcamara L. (Woody Nightshade)*
Scrophularia aquatica L. (Figwort) 1962
Veronica chamaedrys L. (Germander Speedwell)* a
V. spicata L. (Spiked Speedwell) casual, 1961
V. arvensis L. (Wall Speedwell)*
V. persica Poir. (Buxbaum's Speedwell) a, 1959
Rhinanthus minor L. (Yellow Rattle)*
Odontites verna (Bellardi) Dumort. (Red Bartsia)* a
Prunella vulgaris L. (Self-heal)*
Lamium purpureum L. (Red Dead-nettle)*
Glechoma hederacea L. (Ground Ivy)*
Plantago major L. (Great Plantain)*
P. lanceolata L. (Ribwort)*
P. maritima L. (Sea Plantain)* c, c.b.
P. coronopus L. (Buck's-horn Plantain)*s.t.
Campanula rapunculoides L. (Creeping Bellflower)* al
Sherardia arvensis L. (Field Madder)* s.t.
Cruciata chersonensis (Willd.) Ehrend. (Crosswort) n
Galium mollugo L. (Hedge Bedstraw)* w
G. verum L. (Lady's Bedstraw)* s.t.
G. aparine L. (Cleavers)* a, d_1
Sambucus nigra L. (Elder)*
Valerianella locusta (L.) Betcke (Lamb's Lettuce)* s.t.
Valeriana officinalis L. (Common Valerian)* d_1
Dipsacus fullonum L. (Teasel)*
Helianthus annuus L. (Sunflower) al; d_1, 1954
Senecio jacobaea L. (Ragwort)*
S. jacobaea var. *floxulosus* DC. (Rayless form of Common Ragwort)*w
S. erucifolius L. (Hoary Ragwort)* c., w
S. squalidus L. (Oxford Ragwort)* al
S. viscosus L. (Sticky Groundsel) al
S. vulgaris L. (Groundsel)*
Tussilago farfara L. (Coltsfoot)*
Inula conyza DC. (Ploughman's Spikenard)* p.c.
Pulicaria dysenterica (L.) Bernh. (Fleabane)*
Filago germanica (L.) L. (Common Cudweed)
F. apiculata G. E. Sm. or *F. spathulata* C. Presl (Material too young for determination) E. Y.; s.t.; c.b., 1954
Aster tripolium L. (Sea Aster)* c, c.b.
A. tripolium var. *discoideus* Rchb. (Rayless form of Sea Aster)*
Erigeron acer L. (Blue Fleabane)* w, d_1, c.b.
Conyza canadensis (L.) Cronq. (Canadian Fleabane) R; al; w, 1948
Bellis perennis L. (Daisy)*
Achillea millefolium L. (Yarrow)*
Tripleurospermum maritimum (L.) Koch (Scentless Mayweel)*
Matricaria matricarioides (Less.) Porter (Rayless Mayweed)*
Chrysanthemum leucanthemum L. (Ox-eye Daisy)*
Artemisia vulgaris L. (Mugwort)* w
A. maritima L.(Sea Wormwood)* c, l.b.c.

Arctium minus sensu lato (Burdock)*
Carduus nutans L. (Musk Thistle)*
Cirsium vulgare (Savi) Ten. (Spear Thistle)*
C. arvense (L.) Scop. (Creeping Thistle)*
C. arvense (L.) Scop. var *incanum* (Fisch.) Ledeb.* al; E.Y.; d_1
Centaurea nigra L. (Hardheads)*
Hypochoeris radicata L. (Common Cat's Ear)*
Leontodon autumnalis L. (Autumnal Hawkbit)*
L. taraxacoides (Vill.) Mérat (Hairy Hawkbit)* s.t.
Picris echioides L. (Bristly Ox-tongue)*
Tragopogon pratensis L. (Goat's-beard)* n
Sonchus arvensis L. (Field Sow-thistle)* r.s.
S. oleraceus L. (Smooth Sow-thistle)
S.asper (L.) Hill (Prickly Sow-thistle)* c
Hieracium pilosella L. (Mouse-ear Hawkweed)* s.t.
Crepis capillaris (L.) Wallr. (Smooth Hawk's-beard)*
Taraxacum officinale sensu lato (Dandelion)*
Alisma plantago-aquatica L. (Water Plantain)* w
Triglochin maritima L. (Sea Arrow-grass)* c
Zostera marina L. (Eel-grass) formerly washed up in bay; Y
Z. noltii Hornem. (Dwarf Eel-grass)* Humber mud flats; *Y.N.U. Ann. Rep.* 1974; Y
Potamogeton pectinatus L. (Fennel-leaved Pondweed)* c
Ruppia maritima L. (Tassel Pondweed)* R; *Nat.* 1946, 155; dike, n, 1974; c
Asparagus officinalis L. (Asparagus) al, 1960
Ornithogalum umbellatum L. (Star-of-Bethlehem) esc., w
Endymion non-scriptus (L.) Garcke (Bluebell)* esc.
Juncus gerardii Lois. (Mud Rush)* c, n
J. bufonius L. (Toad Rush)* n, w
J. inflexus L. (Hard Rush)
J. conglomeratus L. (Compact Rush)
J. effusus L (Soft Rush)
J.maritimus Lam. (Sea Rush)* R; c, first recorded 1961
J. articulatus L. (Jointed Rush)
Luzula campestris (L.) DC. (Field Woodrush)*
Narcissus pseudonarcissus L. (Daffodil)* esc.
Iris sp.* esc.
Ophrys apifera Huds. (Bee Orchid) w, 1950 one plant
Orchis morio L. (Green-winged Orchid)* w
O. mascula (L.) L. (Early Purple Orchid) w
Dactylorchis fuchsii (Druce) Vermeul. (Common Spotted Orchid) w, 1961
Anacamptis pyramidalis (L.) Rich. (Pyramidal Orchid)* w, d^1
Lemna minor L. (Duckweed)* w
Scirpus maritimus L. (Sea Club-rush)* c, r.s.
Eleocharis palustris (L.) Roem. & Schult. (Common Spike-rush)* n
Carex distans L. (Distant Sedge)* R; c, w
C. extensa Gooden. (Long-bracted Sedge)* R; c
C. flacca Schreb. (Glaucous Sedge)*
C. caryophyllea Latourr. (Spring Sedge)* s.t.
C. otrubae Podp. (False Fox-sedge)* c, w
C. arenaria L. (Sand Sedge)*
Phragmites communis Trin. (Common Reed)*
Festuca rubra L. subsp. *rubra* var. *arenaria* Fries (Sand Fescue)*
F. ovina L. (Sheep's Fescue)* s.t.
Lolium perenne L. (Rye-grass)*
Puccinellia maritima (Huds.) Parl. (Sea Meadow-grass)*

P. distans (L.) Parl. (Reflexed Poa)* n
Catapodium rigidum (L.) C.E. Hubbard (Hard Poa)* o
C. marinum (L.) C.E. Hubbard (Darnel Poa)* R; o; l.b.c., c.b.
Poa annua L. (Annual Meadow-grass)*
P. compressa L. (Flattened Meadow-grass)* w
P. pratensis L. (Smooth Meadow-grass)*
P. subcaerulea Sm. *Nat.* 1946, 155
P. trivialis L. (Rough Meadow-grass)
Dactylis glomerata L. (Cock's-foot)*
Cynosurus cristatus L. (Crested Dog's-tail)*
Briza media L. (Quaking grass)* w
Bromus sterilis L. (Barren Brome)
B. mollis L. (Soft Brome)*
B. thominii Hard. w
Brachypodium pinnatum (L.) Beauv. (Heath False-brome)* w
Agropyron repens (L.) Beauv. (Couch-grass)*
A. pungens (Pers.) Roem. & Schult. (Sea Couch-grass)*
A. pungens var. *setigerum* Dumort.* d_1
A. junceiforme (A. & D. Löve) A. & D. Löve (Sand Couch-grass)* s.s.
A. junceiforme × *A. pungens* = *A.* × *obtusiusculum* Lange*
Elymus arenarius L. (Lyme-grass)* R; r.s.
Hordeum secalinum Schreb. (Meadow Barley)* n, c
H. murinum L. (Wall Barley)* w
Arrhenatherum elatius (L.) Beauv. ex J. & C. Presl (False Oat)*
Holcus lanatus L. (Yorkshire Fog)*
Deschampsia caespitosa (L.) Beauv. (Tufted Hair-grass)
Aira praecox L. (Early Hair-grass)* s.t.
A. caryophyllea L. (Silvery Hair-grass)* o
Ammophila arenaria (L.) Link (Marram)*
Agrostis tenuis Sibth. (Common Bent-grass)*
A. stolonifera L. (Creeping Bent-grass)* n
Phleum arenarium L. (Sand Cat's-tail)* E.Y; o
Alopecurus pratensis L. (Meadow Foxtail)
A. geniculatus L. (Marsh Foxtail)* n
Anthoxanthum odoratum L. (Sweet Vernal-grass)*
Parapholis strigosa (Dumort.) C.E. Hubbard (Sea Hard-grass)* c
P. incurva (L.) C.E. Hubbard (Curved Hard-grass)* Y; o; c.b., *Nat.* 1970, 131
Spartina anglica C.E. Hubbard (Cord-grass)* r.s., sparse in 1946, now extensive on the mud flats of the R. Humber.

Hedges by **E. Pollard**, **M. D. Hooper** and **N. W. Moore**. *New Naturalist* Series, No. 58. Pp. 256, with 20 plates, 56 text figures and 20 tables. Collins, 1974. £3.50.

All three authors of this unusual book are members of the staff of the Nature Conservancy Council's Monks Wood Experimental Station and clearly have a commitment to their subject. Not the least interesting element in the book is the description of studies they have performed on Judith's hedge, which is part of the ancient boundary of Monks Wood, and on the development of new experimental hedges planted in the same vicinity.

The book is divided into four main parts dealing respectively with the history of hedges, their flora, fauna and the place of the hedge in agriculture.

Descriptions of the diversity of hedges, their origins, development and management are informative and lucid. There is important information on the extent of the recent removal

of hedge boundaries in many areas, though one wishes that the authors had been able to spare more space for this controversial development. The now widely reported method for estimating the age of a hedge by the simple means of determining the number of shrubby species present (approximately 100 years of age for every species) is discussed. This technique was indeed developed by Dr. Hooper. It is shown that at least for old hedges this method generally works extraordinarily well, though it is of course totally confounded wherever, as has sometimes happened, a variety of species were incorporated in the original planting of the hedge.

In consideration of the flora of hedges, independent treatment is given to a very few species of special importance or interest, namely hawthorn, black bryony, stinging nettle and elms, though the discussion of the spread of Dutch elm disease has been overtaken by melancholy events since the manuscript was completed. With respect to the nettle, it is pointed out that herbicides such as paraquat are incapable of eradicating nettle (or couch), but highly effective in eliminating the rich invertebrate fauna of the nettle, which of course includes some of our most showy and pleasing nymphalid butterflies. The authors are clearly aware of the concept of the hedge providing a 'hybrid' habitat intermediate between woodland and arable field, but surprisingly no mention is made of the part played by hedges in promotion of introgression between the red and white campions, the subject of a pioneer study some years ago by Herbert Baker.

Since the hedge is literally a man-created environment, one ought not to be surprised that very few species of plant or animal seem to be principally dependent on the hedgerow. Perhaps the most important of those that are is the Brown Hairstreak butterfly, a scarce but beautiful insect of rather inconspicuous habits. In a brief but valuable discussion, evidence is presented that this butterfly is predominantly dependent on hedges for maintenance of its now tenuous distribution, and a practicable measure (a change in hedgerow management) is suggested by which its apparently continuing decline in numbers might be arrested.

The authors have maintained an attitude of scrupulous objectivity throughout the book. The ardent conservationist eagerly seeking ammunition here will find only luke-warm comfort. It seems that in most parts of the country retention of hedges is not justifiable on economic or agrarian grounds. The available evidence, as distinct from sentiment, indicates that the balance between the value of hedges as a source of beneficial insects and their detriment as a reservoir or source of pests is apparently approximately even. The case for retention of hedges must rest therefore principally on their amenity value, an asset which not many farmers can be expected to value highly in the present harsh economic climate. There is, it seems, a good case for fresh plantings of cheap willow hedges in the fenlands to reduce wind-erosion of soil (an increasing problem), but even here, presumably because of the anxiety of the authors to maintain an impartial attitude, the case is not made with any great warmth or emphasis.

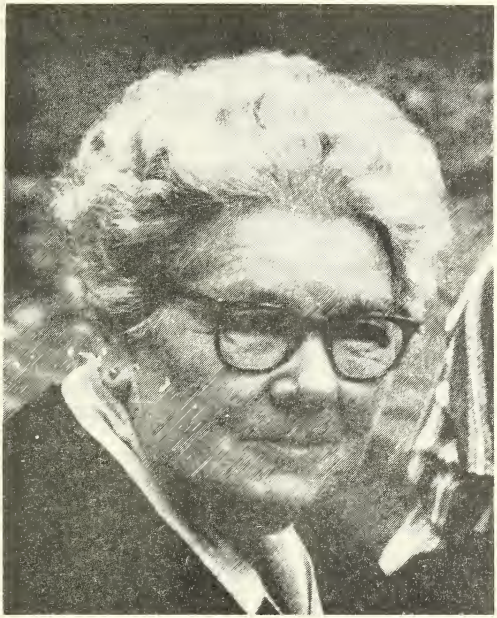
The quality of production of this book is equal to that now to be expected of the celebrated *New Naturalist* series. One notes only one evident defect; the index is clearly the work of an industrious and enthusiastic but inexperienced hand. Thus one may look in vain for direct entries for the Brown Hairstreak, either as such or under hairstreak, or even as *Thecla betulae*. It is included however, not only under butterfly, but also under blackthorn, hedge management, Huntingdonshire, Lincolnshire, Sussex and Weald, all of which refer to the same two pages of text! It is even more difficult to understand why there is no collective entry for Judith's hedge, which plays an extremely prominent part in different sections of the book. But these are almost frivolous complaints.

The authors, who have themselves done much to increase our knowledge of the ecology of our hedgerows, have done a valuable service in writing this book about a clearly understudied feature of our country landscape. However, their objective and impartial approach leaves it for each reader to decide for himself to what extent our hedges constitute an under-valued natural asset. This is an authoritative and interesting book, the more valuable because of its uniqueness. It is strongly recommended to all with an interest in our natural heritage, but in particular it is recommended to all concerned with the practical problems of conservation. J.D.L.

CATHERINE MURIEL ROB F.L.S.
1906-1975

By the death of Kitty Rob after a long illness bravely borne, Yorkshire has lost a notable botanist, the Yorkshire Naturalists' Union a staunch supporter and a host of naturalists and others throughout the county and country, a valued friend. She lived throughout her life at Catton Hall near Thirsk. She was born there on 21st February 1906 and died there on 6th February 1975.

Though the North Riding is more thinly supplied with naturalists than any other part of Yorkshire, Thirsk has been a centre of unbroken botanical activity for well over a century. J. G. Baker and William Foggit were the first, T. J. Foggitt was the leading light after his father's death and Kitty Rob, who acquired her early interest and guidance in field botany from T. J. and Gertrude Foggitt at whose home I first met her more than 40 years ago, continued the tradition.



Kitty Rob joined the Yorkshire Naturalists' Union in 1934 and at once began to play an active part in its work. She became recorder for N. Riding flowering plants in the following year and remained in that office uninterruptedly for 37 years. Within a few years she had become a Divisional Secretary responsible for making arrangements for field meetings at first in N. E. Yorkshire and then N.W. Yorkshire and for 25 years (1939-1963) she continued to serve in that capacity despite the fact that she had also taken over as General Secretary of the Union in 1958, a position she filled for five years. Throughout all this period she played a central role in the activities of the Botanical Section of which she was Secretary from 1955-58 and Chairman in 1970. She was elected President of the Union for 1969.

Her enthusiasm for natural history in general and botany in particular led to her accepting numerous other commitments, for in the giving of her time and help to any cause she felt worth while she was generous to a fault. She was an active supporter and official of the Yorkshire Naturalists' Trust and served as Secretary during its early years. She was also a familiar figure at meetings of the Botanical Society of the British Isles of which she was a

Vice-President from 1961-63, and for very many years she was a pillar of the Wild Flower Society. She gave lectures to natural history and other societies and she conducted W.E.A. courses in botany. Many other local activities unconnected with botany must have benefitted from her help for she always "pulled her weight" in any task to which she turned her hand. No more eloquent tribute to the high regard in which she was held could have been provided than the church at Skipton Bridge, filled to overflowing at her funeral service.

Dr. Leonard Cockayne the distinguished New Zealand botanist employed a phrase to denote a special quality possessed by some naturalists. He used it sparingly and the meaning of the phrase was more easy to comprehend than to define though it implied a mixture of enthusiasm, dedication and joy. Such and such a person he would say "was full of the holy fire". No one could botanise with Kitty Rob without soon becoming aware of "the holy fire" in her. Her zest for field work was infectious and of all the roles she filled in the Y.N.U. it was as a Divisional Excursions Secretary that she excelled. She knew the country well, she organized the arrangements efficiently and her friendly welcome to newcomers and regular attenders alike put all at their ease.

Of recent years her interests turned to breeding pedigree Cardigan Corgies at which she won a Best of Breed award at Crufts in 1968. This new outlet for her activity meant that inevitably the botanical fires now burned less brightly and she was seen infrequently at Y.N.U. meetings. But the interest was still there and Catton Hall still remained — like Stoneybrough, Thirsk, the home of the Foggitts in earlier days — an open house to innumerable botanists stopping off for a day or two on their ways north or south to be taken to Teesdale or elsewhere to be shown some special plant. For she was generous and unsparing in her hospitality, though she did not lead an easy life; during almost half of it she shouldered the strain and constant demands attendant upon looking after ailing parents and a succession of invalid relatives.

Kitty Rob's death leaves a void; in Yorkshire especially, for her detailed knowledge of the distribution of North Riding plants was certainly unrivalled. One hopes that much of this has been committed to paper. Her passing deprives field botany of a warm-hearted, invigorating and resilient character; one who had a great zest for life and in whom unselfishness and a ready willingness to help others were outstanding traits. She will be missed by a very wide circle of friends but she will be remembered with affection by all who knew her.

W.A.S.

The Pembrokeshire Coast Path by **John H. Barrett.** Pp. 118 with 41 full colour Ordnance Survey maps and numerous drawings and diagrams. Published for the Countryside Commission by H.M. Stationery Office. 1974. £2.50.

The Pembrokeshire coast path, which was opened in 1970, runs for 167 miles round some of Britain's finest coastline. This guide, which is the third in a series devoted to long-distance paths, describes the route in detail and includes chapters on the geology and shaping of the coast, the archaeology of the area and the wild flowers and birds to be seen. The apparently high price for such a slim volume is illusory for a complete set of extracts from Ordnance Survey maps at 1:2500 needed to walk the path is included and annotated by the author, and the purchase of these maps alone would cost considerably more. This is an essential companion for the long-distance walker or naturalist who cannot afford *not* to acquire it before visiting this splendid coastline.

TWO UNDESCRIBED DEMATIACEOUS HYPHOMYCETES

B. C. SUTTON
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SUMMARY
Endophragmia coronata sp. nov. is described from litter of *Taxus baccata* with cylindrical to long cuneiform, distoseptate, smooth, pale brown conidia in which the apices are ornamented with several short projections. *Endophragmiella eboracensis* sp. nov. is hyperparasitic on *Diatrype stigma* and is characterised by 1-3 euseptate, cylindrical, smooth, medium brown conidia in which the basal cell is often paler. The relationships of both species to established taxa are described.

During the 1974 Yorkshire Naturalists' Union (Mycology section) Autumn foray at Sheffield, a number of interesting hyphomycetes were found on a variety of substrates. A detailed list appears in Bramley (1975). Not included in the list are two species that to my knowledge are undescribed. *Endophragmia coronata* sp. nov. was found while looking for *E. taxi* M. B. Ellis, a species described from North America and known in Great Britain from only three collections, one on conifer needles and two isolated from *Taxus baccata*. A collection of *T. baccata* from Anston Stones Wood yielded *E. taxi*, and another collection made in Chatsworth Park provided *E. coronata* but no *E. taxi*. The second undescribed species, *Endophragmiella eboracensis*, was found mixed with a number of other hyphomycetes overgrowing old stromata of *Diatrype stigma*, a typically hyperparasitic mode of habit that is shared by the two existing species of the genus.

Endophragmia coronata sp. nov.
(etym. adj. *coronatus*—crowned)

Coloniae effusae, pilosae, sparsae. Mycelium immersum ex hyphis ramosis, septatis, brunneis, laevibus, 2-3μ crassis compositum. *Conidiophora* macronemata, mononemata, singula vel raro 2-3 fasciculata, non ramosa, recta vel leniter flexuosa, atro brunnea, apicem versus pallidiora et decrescentia, laevia, 3-7 septata, usque ad 70μ longa x 2-4μ crassa, ad basim 8-9μ crassa, cum 0-11 proliferationibus terminalibus successivis vel cupula singula 5-6μ diam munita. *Cellulae conidiogenae* holoblasticae, annellidicae, terminales, in conidiophoris incorporatae, indeterminatae. *Conidia* solitaria, sicca, acrogena, cuneiformia vel longa cuneiformia vel cylindrica, recta vel leniter curvata in conidiis longissimis, 2-3(-11) distoseptata, laevia, luminibus deminutis, pallide brunnea, ad apicem quadricornuta, ad basim truncata, 23-28(-80)μ longa x 3-4μ crassa, ad apicem 5.5-7.5μ crassa.

In foliis et viulis *Taxi baccatae*, Chatsworth Pk, Derbyshire, U.K., 27 Sept. 1974, B.C. et A. V. Sutton, IMI 188487*a*, holotypus.

Colonies effuse, hairy, sparse. Mycelium immersed, composed of branched, septate, brown, smooth hyphae 2-3μ wide. Conidiophores macronematous, mononematous, mostly single, occasionally in small groups of 2-3, unbranched, straight or slightly curved, dark brown, tapered slightly and paler towards the apex, smooth, 3-7 septate, up to 70μ long x 2-4μ wide, swollen at the base to 8-9μ wide, with either several percurrent proliferations (up to 11) or larger single flared cups 5-6μ diam. Conidiogenous cells holoblastic, annellidic, integrated, terminal, indeterminate. Conidia solitary, dry, acrogenous, when young distinctly cuneiform, later becoming long cuneiform to cylindrical, straight or in very long conidia slightly curved, smaller conidia 2-3 distoseptate, longer conidia up to 11 distoseptate, smooth, lumina reduced, pale brown, apex crowned with up to four short projections 3μ long, base truncate, 23-38μ long (including projections) x 3-3.5μ wide at the base (5.5-7.5μ wide at the apex), 11 septate conidia up to 80μ long x 4μ wide.

Of the species so far described in *Endophragmia* Duvernoy & Maire, *E. coronata* most closely resembles *E. hyalosperma* (Cda.) Morgan-Jones & Cole and *E. boothii* M. B. Ellis, both of which have distoseptate conidia. There are also two further undescribed species, with

similarly septate conidia: *E. parva* M. B. Ellis on *Buxus* from England, which will be published in 1976 and *E. cuneiformis* Sutton on *Eucalyptus*, which will appear in a forthcoming account of the hyphomycetes involved in *Eucalyptus* leaf litter colonisation in Brazil. *E. coronata* differs not only from these closely related species, but also from the *Endophragmia* species with euseptate conidia, in having coronate ornamentation at the conidial species. It is the only species in the genus to demonstrate this feature. Besides being unique for this particular *Endophragmia* species, coronate conidia are not very common in the hyphomycetes as a whole. They are known in *Coronospora dendrocalami* M. B. Ellis (1971), *Triposporina uredinicola* Höhnel (Deighton & Pirozynski, 1972), and *Heliscus lugdunensis* Sacc. & Therry (Kendrick & Carmichael, 1973). An analogy with the teliospores of *Puccinia coronata* Cda (Wilson & Henderson, 1966), which causes crown rust of oats, is not out of place in this context.

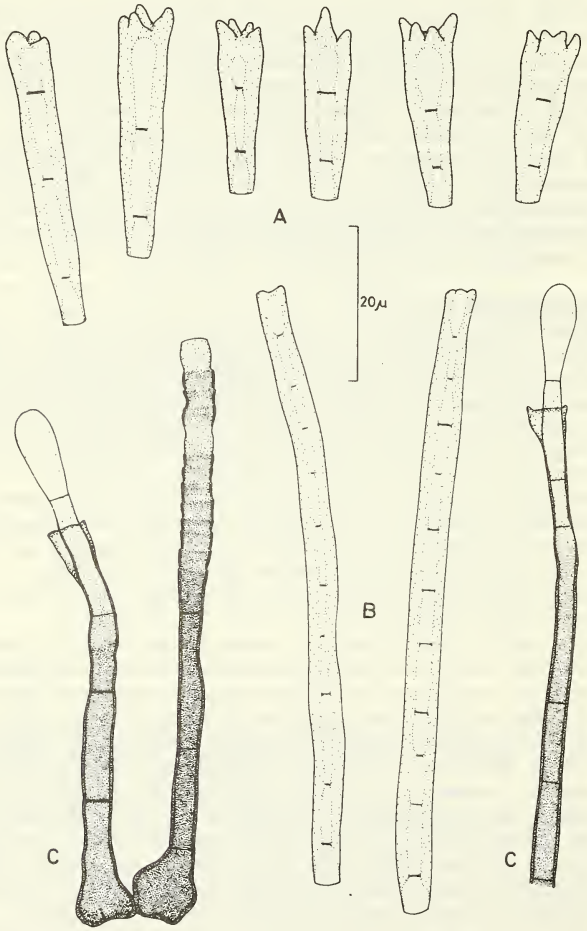


Fig. 1. *Endophragmia coronata.* A, normal 2-3 septate conidia; B, abnormal 10-11 septate conidia; C, conidiophores.

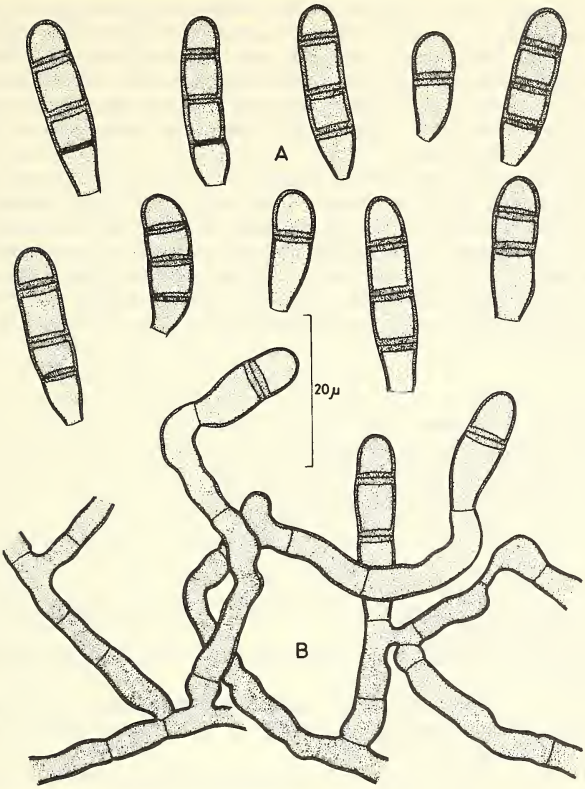


Fig. 2. *Endophragmiella eboracensis.* A, conidia; B, conidiophores.

Endophragmiella eboracensis sp. nov.

(etym. adj. der. *Eboracum* = York)

Coloniae effusae, brunneae, pilosae. Mycelium superficiale vel immersum, ex hyphis ramosis, septatis, laevibus, brunneis, 3.5-4.5μ crassis compositum. *Conidiophora* macronemata, mononemata, simplicia vel ad basim irregulariter ramosa, erecta vel semiprostrata, flexua et intertexta, septata, brunnea, apicem versus pallide brunnea, laevia, usque ad 65μ longa x 4-5μ crassa. *Cellulae conidiogenae* holoblasticae, in conidiophoris incorporatae, terminales, determinatae, sine proliferationibus percurrentes, pallide brunneae, cylindricae. *Conidia* solitaria, sicca, acrogena, cylindrica vel obovoidea, laevia, 1-3 euseptata, ad septa non vel leniter constricta, ad apicem obtusa, basim versus abrupte decrescentes, truncata, fimbriata, medio brunnea, cellula basali pallidiora, 14.5-26 × 5-6μ.

In stromatibus veteribus *Diatrype stigmatis* in ramulis ignotis, Anston Stones Wood, Yorkshire, U.K., 30 Sept. 1974, B. C. & A. V. Sutton, IMI 188569*d*, una cum *Camposporium pellucidum* (Grove) Hughes, *Chloridium chlamydosporis* (Van Beyma) Hughes et *Dactylella phymatophaga* Drechsler.

Colonies effuse, brown, hairy. Mycelium superficial and immersed, composed of branched, septate, smooth, brown hyphae 3.5-4.5μ diam. Conidiophores macronematous, mononematous, simple or more frequently branched irregularly at the base or along the

length, erect or semi prostrate, flexuous and intertwined, septate, brown, becoming pale brown towards the apex, smooth; ascendant conidiophores up to 65μ long x 4.5μ wide. Conidiogenous cells holoblastic, integrated, terminal, determinate, without percurrent proliferations, pale brown, cylindrical. Conidia solitary, dry, acrogenous, cylindrical to obovoid, smooth, 1-3 euseptate, slightly constricted at the septa, apex obtuse, abruptly tapered to a truncate base with a marginal frill, thick-walled, medium brown, often the basal cell pale brown, 14.5-26 x 5-6μ.

Endophragmiella was introduced by Sutton (1973) for two hyperparasitic species, *E. canadensis* (Ell. & Ev.) Sutton on *Valsa ambiens*, and *E. pallescens* Sutton on *Cytospora chrysosperma*, both of which are only known from Canada. *E. eboracensis* differs by the distinctive nature of the conidia. *E. pallescens* conidia are 1(-2) septate, smooth and of even pigmentation, and *C. canadensis* conidia are 2-3 septate, verruculose and with the apical and basal cell paler than the median ones. In *E. eboracensis*, conidia are mostly 3 septate, smooth and with only the basal cell somewhat paler. The three species can be distinguished in the following key.

KEY TO ENDOPHRAGMIELLA

1. Conidia 1(-2) septate, smooth, 12.5-19 x 6.5-7μ ..... *E. pallescens*
1. Conidia consistently more than 1-septate 2
2. Conidia 2-3 septate, verruculose, 23.5-35 x 12-15μ ..... *E. canadensis*
2. Conidia 1-3 septate, smooth, 14.5-26 x 5-6μ ..... *E. eboracensis*

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THE SHEFFIELD FORAY, 1974

W. G. BRAMLEY

The first excursion to Chatsworth attracted about a dozen members gathered from a wide area. Starting in a slight drizzle the grass and wood edge near the stables soon provided quite a number of specimens including *Helvella lacunosa* and this proved eventually the best though the smallest collecting area of the day. The woodlands were not so fruitful, having a dense undergrowth of *Rhododendron* in many parts. Dr. B. C. Sutton of C.M.I., who we were delighted to have with us, was periodically lost to view wherever Sweet Chestnuts grew, collecting the mast. Here and at Eccleshall Wood he found six of the seven species of Hyphomycetes he has recently described growing on this, in Yorkshire, not very common host. After a gentle climb to the plateau the drizzle increased and a steep and slippery descent was made to the cars for lunch. By that time a gentle rain was falling and a retreat was made back to the laboratory to look at the morning's gatherings.

Saturday saw us again in Derbyshire — the old Yorkshire mycologists must have turned in their graves — in the Longshaw area. Padley Wood was much more interesting so no great distance was covered. Later the party split, some going back to the workroom, the others spending a couple of hours on the Longshaw House estate, adding a few more species to the list, until again rain took us back to the cars. On this outing we were joined by several local naturalists and there were well over twenty present.

Sunday was fine and bright for the investigation of Eccleshall Wood and again over twenty people were out. *Boletus elegans* was there and a few yards away a group of *Leptopodia elastica* was found which later caused some discussion when compared with Dissing's monograph. There are apparently only three records for the county in the past thirty years and whether *Helvella albidula* under which it is recorded here is distinct is open to question. Other life was about as head scratching and the appearance of insect repellant indicated the presence of biting midges which got worse as the woods were entered. After lunch a short journey to Limb Valley with a dryish steep bank proved somewhat lacking in agarics, but it was nice to find *Lentinus cochleatus* and *Rhizina undulata.* On Monday the few members remaining spent a pleasant hour or two at Anston Stones Wood.

A welcome return to our ranks was Dr. C. Booth of C.M.I., who was well known to older members whose memories go back to the forties and fifties, and Dr. Lloyd-Evans also came to keep a presidential eye on us. I should like to thank all who sent me lists of their finds and especially Dr. Sutton who greatly extended the Fungi Imperfecti records. Not since S. J. Hughes used to come to our forays have these rather neglected groups been so assiduously collected. Finally on a personal note, this will probably be the last foray report I shall edit. I have not looked back to see how many years it is since I took over the task, but I look back to the camaraderie of old and young mycologists with great pleasure and shall hope to attend a few more forays.

A = Anston Stones Wood, Yorkshire
E = Eccleshall Wood, Yorkshire
LV = Limb Valley, Yorkshire
C = Chatsworth, Derbyshire
L = Longshaw House, Derbyshire
P = Padley Wood, Derbyshire

DISCOMYCETES (Dr. Sutton; J. Blunt (Sutton Bonington)).

Calycella subpallida, E
Calycellina punctiformis, E.
Diplocarpon rosae (Black Spot of Rose), A.
Helvella albidula Quel., E.
Helotium lutescens, E.
Hyaloscypha dematiicola stat. con. on *Pinus*, E.
Neobulgaria pura, c.
Rhizina undulata, LV.
Rutstroemia luteovirescens, E.
R. sydowiana on *Quercus*, E.
Sclerotinia fuckeliana on *Castanea* & *Quercus*, E.

PYRENOMYCETES (Dr. Sutton; W. J. Blunt).

Diaporthe strumella on Gooseberry, P.
Melanomma subdispersum stat. con., P.

AGARICALES (T. Hering: Mrs. D. Fieldhouse).

Amanita inaurata, C.
Boletus versicolor, LV.
Collybia ambusta, LV.
C. cirrhata, E.
Craterellus cornucopioides, LV.
Cystoderma cacharius, LV.
Hebeloma longicaudatum, C.
Inocybe bongardii, C.E.L.
Laccaria proxima, E.
Lentinus cochleatus, LV.
Lepiota fusco-vinacea, C.
Lyophyllum decastes, C.E.
Marasmius epiphyllus, C.
M. hudsonii, C.
Paxillus panuoides, L.
Russula claroflava, P.
R. rosea, LV.

Other BASIDIOMYCETES

Grifola frondosa, E.
Merulius tremellosus, E.L.
Pistillaria quisquiliaris on *Pteridium*, L.P.

COELOMYCETES (Dr. Sutton).

Camarosporium rosae Grove on *Rosa*, E.
Ceuthospora phacidioides Grev. on *Ilex*, C.E.
Chaetomella acutiseta Sutton & Sarbhoy *ined.* on *Quercus*, P.
Coleophoma cylindrospora (Desm.) Hohn., on *Ilex*, C.E.
C. rhododendri Sydow on *Picea*, A.E.
Coniothyrium fuckelii Sacc., on *Buxus*, C.P; on *Pinus*, L.
Coryneum modonium (Sacc.) G. & M., on *Castanea*, C.
Cylindrosporella microsperma (Pk.) Petrak, on *Betula*, P.
Cryptosporiopsis fasciculata (Tode ex Fr.) Petrak, on *Carpinus*, E.
Leptothyrium medium Cke., on *Quercus*, A.P.
Phomopsis stricta (B. & Br.) Trav., on *Buxus*, C.
Pyrenochaeta ilicis M. Wilson, on *Ilex*, e.
Sclerophoma pythiophila (Corda) Hohn., on *Pinus*, E.
Septomyxa tulasnei (Sacc.) Hohn., on *Acer*, A.L.
Septoria epilobii Westend., on *E. montanum*, L.

HYPHOMYCETES (Dr. Sutton).

Acladium conspersum Lk. ex Pers., on dead wood, L.
Anavirga laxa Sutton *ined.*, on *Castanea*, E.
Calcarisporium arbusculum Preuss, on *Xylaria*, L.
Camposporium pellucidum Grove & Hughes, on *Fagus*, A.C.
Chalara aurea (Corda) Hughes, on *Picea*, E.
C. cylindrica Karst., on *Castanea*, E; on *Taxus*, A.
Chloridium chlamydosporis (Van Beyma) Hughes, on *Betula*, P; on *Castanea*, C; on *Diatrype stigma*, A.
Clathrosphaerina zalewskii van Beverw., on *Castanea*, E.
Cristulariella depraedans (Cke.) Hohn., on *Acer*, A.C.
Dactylella phymatophaga Drechs., on *Diatrype stigma*, A.
Dictyosporium toruloides (Corda) Gueguen, on *Rosa*, E.
Dorantomyces nanus Ehrenb.) Morton & Smith, on *Castanea*, E.
Endophragmia alternata Tubaki & Saito on *Rosa*, E.
E. taxi M. b. Ellis, on *Taxus*, A.
Haplariopsis fagicola Oud. on *Fagus*, P.
Oidiodendron tenuissimum (Peck) Hughes, on *Castanea*, E; on *Fagus*, L.
Pleurophragmium parvisporum (Peck) Hol. & Jech., on *Urtica*, L.
Pleurotheciopsis pusilla Sutton, on *Castanea*, E.
Pseudomicrodochium aciculare Sutton *ined.* on *Castanea*, C.E.
Polyscytalum fecundissimum Reiss on *Castanea*, *Fagus*, *Quercus*, E.
Scolecobasidium echinophilum (Massal.) Sutton, on *Castanea*, C.E.
Spondylocladiopsis cupulicola M. B. Ellis, on *Fagus*, C.P.
Sporoschisma juvenile Boud., on *Ribes grossularia*, P.
Tricladium castaneicola Sutton *ined.* on *Castanea*, C.E.
Trimmatostroma betulinum (Corda) Hughes, on *Betula* & *Ilex*, E.
Verticillium tenuissimum Corda, on *Castanea*, C.E.; on *Fagus*, P.; on indet. host. A.

The species marked *ined.* had not been published when the lists were received on October 14th, but the manuscript was in the press.

Dr. Sutton reports that *Chaetomella acutiseta* has a very unusual distribution; on *Acer* leaves in Pakistan, from soil in Canada and now on *Quercus* twigs. *Endophragmia alternata* is rarely found in Britain and of *E. taxi* I.M.I. have only two collections from Britain. A number of collections made by Dr. Sutton are still awaiting determination whilst two new species are the subject of another article in this issue.

BOOK REVIEWS

Charles Darwin's Natural Selection being the second part of his big species book written from 1856 to 1858. Edited by **R. C. Stauffer**. Pp. xii and 692 with 4 plates. Cambridge University Press. £20.

In spite of its length, the *Origin of Species* is really only an abstract of Charles Darwin's opinion on evolution, and he would have indeed so entitled it had it not been for the obduracy of his publisher. When Darwin received the letter from Wallace which told him that the central concept of his theory had also been discovered by someone else, he was already more than half-way through writing a more leisured and lengthy exposition of his views on evolution. In the event, the *Origin*, written in a matter of months rather than years, is in large measure a condensation from this larger work which Darwin never completed. The first two chapters of this unpublished book provided in due course the framework for *Variation of Animals and Plants under Domestication*. Herein lies the explanation of the otherwise bemusing reference to ". . . the second part of his big species book . . ." in the sub-title of the present publication: *Variation* . . . thus constitutes the first part. The rest is now published for the first time.

Because of the haste in which the *Origin of Species* was written, it does not include references to original sources, even though Darwin was perfectly clear just how serious an omission this was and always intended to remedy the deficiency. Thus he wrote in his Introduction to the *Origin* that "No one can feel more sensible than I do of the necessity of hereafter publishing in detail all the facts, with references, on which my conclusions have been grounded; and I hope in a future work to do this." Apart from the material covered in *Variation* . . ., Darwin never achieved this objective.

The great importance of the manuscript of Darwin's "big species book", both for the extended statement of his views and for the references it contains, is self-evident. One's first reaction is astonishment that this manuscript, the main source for one of the most important books ever published, should not itself have been published before now. However, the difficulties were truly formidable. Darwin himself feared that it might prove to be illegible and Professor Staffeur has only been able to complete his task with the aid of research assistants who have been responsible for the greater part, but not all, of the basic task of transcription of the manuscript and have helped to research Darwin's exact sources. It is a pleasant surprise to find that the text proves to be much more than an elaborate source; the manuscript had been polished by Darwin to an extent that makes the book comfortable reading in its own right in this transcribed edition. Furthermore, it is now possible to learn the exact facts which lie behind some of the more obscure generalisations in the *Origin*. For this purpose a correlation of the paginations of the *Origin* and of this book provided by Professor Staffeur is of great value. Overall, the standard of scholarship of this edition befits the stature of its subject.

For all interested in Charles Darwin's contribution to the subject of evolution, this is an extremely important book. Regrettably the price is, perhaps inevitably, formidable to an extravagant degree, but at least students will now be able to obtain access to this most significant source in our larger libraries. J.D.L.

Introducing Geology by **D. V. Ager**. Second edition. Pp. 256 with 21 plates and 62 text figures. Faber and Faber, 1975. £3.95 (hardback), £1.75 (paperback).

Professor Ager's book describes the geological history of the earth's crust in understandable terms. It is mostly devoted to Britain, though other parts of the world are discussed where relevant. It is not an introductory textbook: it is intended for all intelligent readers who wish to know something about the evolution of the stratigraphical sequence and how the geologist reconstructs the past by piecing together the evidence from the rocks and how he infers the forces which brought about past changes. The book was first published in 1961 and this revised edition incorporates the new geological outlook associated with plate tectonics. This is sound science readably written, designed to initiate the uninitiated and it has the added merit of being very reasonably priced. W.A.S.

Badgers of Yorkshire and Humberside by **R. J. Paget** and **A. L. V. Middleton**. Pp. 132 with 4 colour photographs and 30 black and white photographs. William Sessions Ltd, York, 1974. £3.50.

Richard Paget and Adrian Middleton, aided by Keith Bradbury, and with the assistance of the Yorkshire Naturalists' Trust and countless individual field naturalists, have produced an excellent book. If we count the badgers to whom it is devoted we can truly say it has a caste of thousands. The Archbishop of Canterbury in his foreword pays tribute to the authors' thousands of hours of dedicated observations and rightly so.

Half the book is devoted to badger geography in an area of over six thousand square miles and the text flows beautifully over the industrial area of South Yorkshire, the dales, the coast, the fenlands and the moors before crystallising out into a parish by parish record of setts and a distribution and density map. Is there a conservation dilemma here? Is this book a badger-persecutor's *vade mecum*? I have heard both points raised but find myself unable to agree. It is a mind and eye-sharpening experience and its value as a badgers Domesday will last for a very long time, enhancing rather than detracting from the conservation state of this picturesque beast. In this section of the book the underlying geology of each area, its surface conditions, peculiarities of climate and human settlement form the ideal background to the blacks, greys and whites of the distribution map.

The second major division of the book concerns observations on Badger behaviour in general and, in detail, at one sett at Mirfield. This is a year by year account, from 1968 to 1973, and it is beautifully done. The above-ground lives of these animals were well watched and individuals emerged over the period as distinct personalities. Parts of this section could well be anthologised with the best of field accounts of badgers. The essay on the badgers' diet by Keith Bradbury keeps up the level of readable accuracy which is shown throughout.

The only cumbersome thing about the book is its title. It is a strongly regional work but it has much wider application than Yorkshire and Humberside and deserves as wide a readership as possible. For a relatively slim, though very compacted, work the price seemed high at first. However, a quick browse round a bookshop's shelves soon convinced me that this was real value for money.

William Sessions have made a good production and they should share, with the authors and the Yorkshire Naturalists' Trust, in the congratulations which are due. The last word must go to the badgers — the old boar of Mirfield, his mate, his visiting rival and all the hundreds of others who appear in the text and fine photographs, for having found such excellent chroniclers.

T.M.C.

The Year of the Red Deer by **Lea MacNally.** Pp. 112 with 8 pages of colour plates and 100 black and white photographs. J. M. Dent and Sons, 1975. £4.95.

Nobody writes about Red Deer in quite the same way as Lea MacNally. Nor does anyone else quite match his prowess as a deer photographer. Put the two things together and the result is a superb book on Britain's largest land mammal.

The text is a season by season account of the Red Deer's life under Scottish hill conditions. Lea MacNally writes vividly, indeed lovingly, of his subject but avoids sentimentality or over dramatisation as he unfolds his narrative. The straight use of field observations, some of them unique, others tested over repeated seasons is absorbing enough for the taste of any naturalist reader. The rut and the calving seasons tend to dominate popular accounts of Red Deer lives and possibly for this reason Lea MacNally's accounts of the winter and the spring — the difficult months, in his terminology — have added interest. Every stage of the year is covered by the gallery of superb photographs and the subject is treated from birth to death, with some fascinating pictures of rarely-observed behavioural features.

The price must be the only quibble that can be raised in connection with this book — but in these inflationary times perhaps this is not disproportionate.

T.M.C.

The Mammals of Canada by **A. W. F. Banfield.** Pp. xxv + 438, with 46 colour plates, 113 black and white text figures and numerous maps. University of Toronto Press, 1974; obtainable from Books Canada Ltd., 17 Cockspur Street, London SW1Y 5BP. £10.

This is a big book, in scale with the country whose mammal fauna it covers. In all 196 species and a multitude of sub-species are covered, the fauna of half a continent. Some of the colour plates were commissioned in 1923 and the book has been in the making since the nineteen thirties. R. M. Anderson, Austin Rand and Austin W. Cameron were concerned with its production initially but it was left to A. W. F. Banfield to finally complete it, with revisions up to 1973-74, and see it through the press. An epic production indeed.

The result is magnificent. Each species is treated under broad headings of description, habits, habitat, reproduction, economic status, distribution in North American or World terms and Canadian distribution. There are maps of general distribution, the ranges of racial forms in the relevant area, and lists of key references for each species. When will someone do the same for Europe; or even the Common Market countries?

There is considerable interest for European naturalists in the list of species covered however. We share most of the whales, some of the seals and a number of carnivores and rodents have circumpolar distributions which bring them within our aegis. The voles and lemmings of Siberia and northern Europe particularly come into this category and there is no doubt that Dr. Banfield has given us the best account of these species in the English language to date.

To the reviewer there is considerable interest in this book in respect of Canadian attitudes towards mammal studies. There are obviously enormous problems still to be solved in the area of geographical forms but this book does a service in this sector by pointing out the questions that remain to be answered by future workers.

This is no dry as dust encyclopedic account of a foreign fauna, but a fine book which deserves as wide a consideration as possible among mammal-oriented naturalists. It is a scholarly work without doubt but it is also an act of faith and an example to those who set out to treat animal groups on a continental scale. The colour plates of Allan Brooks, recall the days of thirty and more years ago but retain their charm and are admirably complemented by those of C. E. Johnson and J. A. Crosby.

T.M.C.

A History of Fishes by **J. R. Norman**. Third Edition by **P. H. Greenwood.** Pp. xxvi + 467 with 148 figures. Ernest Benn Ltd., 1975. £4.50 paperback: £7.50 hardback.

A great deal of courage is required to take on the task of re-editing such a book as Norman, which has not only become a modern classic but is a book of such highly individual character. Yet the very wide success it has already obtained is the best of reasons for periodically bringing the work up to date, so long as an editor of commensurate breadth of interest in fishes and sympathy for the original concept can be found. Such a combination has unquestionably been achieved and in its present form it is a great pleasure to welcome an old friend and to know just what book to recommend as the first place to look for almost anything about fish.

The list of contents shows the very wide coverage of the subject but the essential unit is the complete fish — however necessary it may be for practical purposes to deal more or less separately with structure, classification, distribution and the rest — and the aim is to answer questions about how these creatures, to use his own quotation, "live, move and have their being". The word fish is conveniently used in the widest sense, since from the first the audience was correctly identified as that large and heterogenous group of people who were just in the process of discovering fish for themselves and wishing to acquire a rather more systematic understanding of their fascinating world. The illustrations are quite excellent and perfectly adapted to the book; printing and paper quality are both good, so the price must be considered reasonable.

T.K.

Animal Physiology: Adaptation and Environment by **Knut Schmidt-Nielsen**. Pp. XVI + 700 with 19 plates, 238 text figures and 70 tables. Cambridge University Press 1975. £7.25.

Professor Schmidt-Nielsen tells us in his preface that he wrote this book in anger and frustration, "because I was unable to give my students a book that in simple words says what I find exciting and important in animal physiology, that deals with problems and their solutions, that tells how things work." He has relieved this frustration by writing a straightforward account of the workings of animals. There is an enormous amount of information in the book, presented in such a way as to be very easy to understand. The many simple, direct diagrams are particularly helpful.

Most physiology books deal mainly with general physiology, with principles which are believed to apply to a wide range of animals, or at least to typical mammals. Oddities tend to be ignored. This book deals with "typical" animals and general principles but pays special attention to animals which have adopted unconventional solutions to problems of life in difficult environments. There are passages about antarctic icefish with antifreeze in their blood, about the buoyancy of the pearly nautilus, about the problems of kangaroo rats living in deserts and about many other fascinating topics. Professor Schmidt-Nielsen is of course a most distinguished comparative physiologist who has worked on the heat and water balance of vertebrates (especially in deserts), on bird respiration and on the energy cost of locomotion.

Students (and lecturers) in zoology and physiology will learn a lot from this book and they will enjoy reading it. R.McN.

Birds' Eggs and Nesting Habits by **Siegfried Hoeher**, adapted by Winwood Reade. Pp. 194; with 32 colour plates. Blandford Press, 1974, £1.60.

Almost every year in the twenty or so during which I have been teaching in the Castleford area, boys have come to me with the claim, "Sir, I know where there's a Goldcrest's nest in Fryston Wood." In my early innocence (and as there are yews in the wood), I used to investigate. Now I merely ask, "Is it on the ground, with a roof over the top and an entrance at the side of the nest, and containing 5 or 6 whitish eggs with reddy-brown spots?" Wonder at my insight quickly turns to disappointment and even disbelief when I advise my eager informant that it is not a Goldcrest but a Willow Warbler nest. Even if convinced himself, I suspect that he may still regard an egg from the nest as a fair swop, as a Goldcrest's.

Books such as the present one must be aimed at the novice and mainly at the young novice. Because of the inherent dangers of books on birds' nests and eggs I invariably advise against putting them into the hands of youngsters. Even with the adequate warnings given in the present text that "with very few exceptions it is *illegal* to take an egg from the nest of any wild bird", and that the safest plan is to *regard the eggs of all species as protected,* I believe that such books still encourage the taking of eggs. There is a temptation to have a collection to match the plates and how much more frequently will the egg be taken to the book, than the book be ready for identification purposes when the nest is found. Apart from this aspect, the limitations imposed by colour reproduction and by portraying only typical examples of what are very variable things, must lead to many misidentifications such as I have indicated above.

It will be argued of course that it was never intended that identification should be attempted merely by comparison with colour plates, though I suspect that often it will. There are keys to nest identification and to egg identification. The limitations of these can be seen by a few examples. Birds which nest "on the ground" on "steep and rocky coasts", include Black-headed Gull and Leach's Petrel. Little Ringed Plover habitat and site is included "on the ground" in "dunes". Under the species list, we read of Scaup: "site on islands in comparatively deep lakes (mainly in Scotland), also on northern moors and tundra. . . . (This species does not breed in central Europe.)" Insufficient attention is drawn to species which cannot be expected to be found nesting in Britain.

I am not happy that this should have been made available in English translation; and even less so because I believe it will prove a real attraction to youngsters. R.F.D.

Birds of the Sheffield Area, edited by **Harold Smith.** Pp. 167. Published by Sheffield City Museums and Sorby Natural History Society, 1974. £1.00 + 20p postage.

The long list of acknowledgements which prefaces this work underlines the co-operative nature of the effort which has gone into it. For a team of people to have produced this first comprehensive account of the avifauna of the area within a 20 mile radius of Sheffield City Museum is no mean achievement. It speaks volumes for the inspired leadership, guidance and sheer determination which have ensured that it ever reached the stage of going to print. The end-product is excellent.

There are maps of the geology and topography of the area and five black and white illustrations not all of which are too happy. The wide variety of habitats related to the geology accounts for the wide variety of birds, no fewer than 110 regular breeding species.

There is a systematic account for each species with more than five sightings. Status, distribution, abundance, habitat and locality preferences, and historical notes are provided. This main section shows commendable consistency, infinite detail and reads well. The results of the B.T.O. Atlas survey are included in a selection of maps for those species where breeding season records are confined to parts only, of the area.

Rare visitors are merely listed (with years of sightings) "since their occurrence is of little scientific value."

A contribution by the Sorby Natural History Society Ringing Group includes maps of recoveries of Starlings, Black-headed Gulls, Swallows and Swifts. There are useful indices of principal localities with map references and of the species in the text.

Birds of the Sheffield area is a first-class publication on which all those involved are to be congratulated. Though only about half of the area under consideration lies within Yorkshire, anyone who is interested in the county's birds will want to provide himself with a copy. He will not be disappointed in it.

R.F.D.

The Leaping Hare by **George Ewart Evans** and **David Thomson.** Pp. 262 with 24 plates and 8 text figures. Faber and Faber, 1974. Paperback edition. £1.50

This book, originally published in 1972, is a fascinating account of the mythology, folk-lore, traditions and superstitions surrounding hares. While basically concerned with hares in the British Isles, the account ranges world-wide. Strictly, perhaps, it is not a book for naturalists, and it is a pity that, since the authors draw attention to the lack of systematic scientific work on hares, they wrote it just before Flux published his important papers on the mountain hare (*J. Zool. Lond. 161, 162*, 1970). Their stricture that a behavioural study of hares is required still applies, however, and their account is likely to stimulate naturalists into paying rather more attention to these neglected mammals.

D.W.Y.

Among the Elephants by **Iain** and **Oria Douglas-Hamilton.** Pp. 285 with 72 plates, 36 in colour, 5 pp. of maps and diagrams and endplates. Collins, 1975. £3.95.

It is rare for a trail of scientific enquiry to be interwoven with such adventurous paths as those trodden by the Douglas-Hamiltons. On the ecological level, the study of the elephants at Lake Manyara in the rift valley was aimed at finding out whether in circumstances of overcrowding the animals themselves would exert some sort of social or biological self-regulation of their numbers, or would eat out their habitat. The problem was ably tackled with various technical adjuncts such as air-spotting and radio, but even more by close association on the ground and elucidation of the place of individuals in the matriarchal society. Crucial quantitative data and fascinating notes on behaviour were accumulated over several years during which the authors became so integrated with their wild environment that the reader inevitably ends enthralled also by the human side of their story. It concludes with a summary of the conservation problem. Illustrations are most apt and beautiful. In answering so many questions and posing new ones, this book seems destined to be valued as a classic of naturalist writing.

G.E.P.

An Illustrated Guide to Aquatic and Water-borne Hyphomycetes (Fungi Imperfecti) by **C. T. Ingold.** Pp. 96 with numerous drawings and text figures. Freshwater Biological Association, 1975. £1.

Some thirty years ago a paper by Professor Ingold brought the occurrence of fungi inhabiting submerged leaves into prominence. Since then a lot of attention has been paid to these organisms and much has been published as separate papers in periodicals throughout the world. Now Professor Ingold has brought together a resume of these papers, particularly as they relate to the British Isles.

A short introduction discusses the morphology and phylogenetic aspects of these organisms together with a short account of methods of collecting and examining them and making pure cultures. The main body of the work consists of descriptive accounts of the genera and species illustrated with line drawings of spores and conidial configuration, mostly drawn to a uniform scale.

This small book should give amateurs an incentive to extend their collecting to this group as little equipment is needed. Like many other groups in mycology, aquatic hyphomycetes have been neglected for the simple reason that there has been no easily available textbook and amateurs, unless they live in a big town, have some difficulty in getting access to periodicals. My only criticism is that few measurements have been given though these can be easily calculated from the drawings which are to a convenient scale.

The book is printed on good paper with clear illustrations and has an extensive bibliography; its usefulness coupled with its low price in these inflationary days makes its purchase well worth while.

W.G.B.

Curiosities of Natural History by **Francis T. Buckland.** Facsimile of the third edition of 1858, originally published by Richard Bentley, London; republished 1975 by EP Publishing Limited, East Ardsley, Wakefield, Yorks. Pp. xvi + 319 with 3 figures. £3.50.

The last century saw the appearance of many popularisations of science, some more widely scientific than the above such as those of Lankester and others more serious natural history such as those of Gosse, but none more eclectic nor enthusiastic than those of Francis Buckland. His father was a geologist and theologian, a less unlikely combination in those days, and inspired his son with a life-long love for the world of nature. The result was a collection of observations, travellers' tales, anecdotes and so on put together in a highly haphazard manner but making very entertaining bedside reading and well represented by the present reproduction of one of his books. To anyone interested in the history of popular science, or equally in a genuine English eccentric, this book is warmly recommended — parts may raise a smile but other parts are disconcertingly to the point.

T.K.

Warm Greenhouse Plants and their Cultivation by **George E. Whitehead.** Pp. 217 with 13 illustrations in colour (on two plates), 23 in monochrome and 16 figures. Faber and Faber, 1975. £4.75.

This book is obviously written by a thoroughly practical gardener and the advice he gives on greenhouse management in the first part of the book is sound and clearly stated. The second and larger part of the book deals with the plants themselves and this is somewhat less satisfactory, being married by occasional erroneous excursions into the realm of botany; however this will not greatly affect its value to the gardener. The choice of plants covers a wide range rather than concentrating only on the more popular sorts. By doing this it is hoped that when a reader is faced by a plant not mentioned, he will at least find something closely related which will act as a guide to treatment. The final chapters cover available types of greenhouses, methods of heating and various auxiliary aids. The illustrations are of excellent quality but unfortunately not correlated with the text.

The book is definitely not a scientific treatise and there are a number of details with which one could quarrel. Nevertheless the beginner will find it a practical, useful and fairly reliable guide.

T.S.C.

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Quarterly Journal of Natural History for the North of England

Edited by W. A. SLEDGE, Ph.D., B.Sc., The University, Leeds

Assistant Editor M. R. D. SEAWARD, M.Sc., Ph.D., F.L.S., The University, Bradford

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THE NATURALISTS' YORKSHIRE

Compiled by members of The Yorkshire Naturalists' Union and edited by W. A. Sledge. Pp. 96 with 15 photographic illustrations. Dalesman Publishing Co. Ltd. Obtainable from The Editor of *The Naturalist*. Price 60p plus 11p postage.

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from The Editor of *The Naturalist*. Price 50p plus 8p postage.

Also "The Macro-lepidoptera of Spurn Head, E. Yorkshire" by S. L. Sutton and B. R. Spence (ex *The Naturalist*, 1974); price 25p plus 5½p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

CHISLETT MEMORIAL LECTURE, 1976

Preliminary Notice. Members are asked to make a note in their diaries, and society programme secretaries to include in their local society syllabuses:

The 12th (and final) Chislett Memorial Lecture will be held at 6.30 on Saturday 13th March, 1976 in Harrogate.

Full details will be circulated later but the speaker booked for this occasion is Edward E. Jackson, formerly of Masham and now Education Officer to the Wildfowl Trust. His lecture "North of the Desolate Sea" will deal with an expedition to Spitzbergen.

Subscription rates: Issued free to individual members of the Yorkshire Naturalists' Union and to Affiliated Societies.

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1875-1975

With this issue *The Naturalist* celebrates its centenary. The first part was printed in Huddersfield and published in August 1875. It was sponsored by the Societies in the "Union of the West Riding Consolidated Naturalists' Society", the precursor of the Yorkshire Naturalists' Union. A short-lived journal with the same name and bearing the sub-title *Journal of the West Riding Consolidated Naturalists' Society* had been printed in Huddersfield from May 1864 to April 1867 and an even shorter venture under the same aegis bearing the title *The Yorkshire Naturalists' Recorder* was edited and printed at Wakefield from July 1872 to August 1873.

These three publications are all directly connected with the Yorkshire Naturalists' Union. Four other publications which have been claimed as our predecessors had appeared between 1833 and 1860, the second and third of which were issued under the title of *The Naturalist*. The first in this series was unconnected with the rest or with Yorkshire, the remaining three were connected through a common publisher but they were essentially publisher's ventures and all died an early death, the longest attaining the age of seven years and ten months. The fact that three of their editors lived in Yorkshire and that the journal was printed in Yorkshire does not constitute a valid link with our own journal since all were intended to cover the whole country and none had particular associations with Yorkshire or northern England save for the fortuitous connection of their editors' place of residence.

The history of *The Naturalist* has been dealt with previously on at least three occasions. W. Denison Roebuck's Presidential Address to the Y.N.U. delivered at Sheffield on 29 January 1904 was entitled "Salient features in the History of the Yorkshire Naturalists' Union". This was issued in pamphlet form the same year and is included in Part 35 of the *Transactions of the Y.N.U.* T. Sheppard's Presidential Address on "Yorkshire's Contribution to Science", delivered at Leeds on 5 December 1914 was printed in *The Naturalist* (1915: 17-25, 71-77, 109-114, 131-138) and was published in extended form as a volume under the same title issued in 1916. In the part referring to the history of our journal Sheppard points out a number of errors and omissions in Denison Roebuck's account. In August 1940 E. G. Bayford contributed a short paper (*Nat.* 1940: 203-204) entitled "Some Notes on the History of *The Naturalist* 1875-1940". This was followed in the next part (*Nat.* 1940: 228-232) by a paper on "The Predecessors of *The Naturalist*. A Critical Survey" and these papers must be regarded as the most definitive account dealing with the early history of our journal.

Throughout the life of *The Naturalist* editorial changes have been infrequent, a fact which has no doubt contributed to stability. For the first nine years of its existence it was edited by C. P. Hobkirk and G. T. Porritt and was printed at Huddersfield. In August 1884 both the editing and printing were shifted to Leeds. W. Denison Roebuck then became editor and continued in office until 1902, jointly with W. Eagle Clark until the end of 1888 and with the assistance of E. R. Waite in 1892. During the next thirty years T. Sheppard and T. W. Woodhead were joint editors though effectively the journal was managed by Sheppard. The printing was also transferred to Browns of Hull who continued as our printers and later as publishers for 60 years. On Sheppard's retirement at the close of 1932 Dr. W. H. Pearsall and W. R. Grist took over as editors and ten years later when Dr. Pearsall left Leeds, I joined Mr Grist. From 1947 until the present year I have acted alone.

From the time of its foundation until the Second World War, *The Naturalist* was a monthly magazine and during Sheppard's long reign it appeared with commendable promptitude at the beginning of each month. Wartime shortage of paper and other exigencies compelled a change from monthly to quarterly publication, the part for April 1942 being the last monthly part to be issued. It was no small achievement to continue publication at all during those black years when the pursuit of natural history often seemed

frivolous and irrelevant. No reversion to monthly publication was considered after the war; the changes in type size and format which followed upon the substitution of quarterly for monthly publication obviated any drastic reduction in the annual quantity of matter published, indeed in the post-war decade when stringencies were at an end, the size of each part tended to fluctuate with the matter available and up to 60 pages were included in a single issue. The turn of the financial screw has since necessitated a close watch on such matters.

In the early part of the nineteenth century the study of natural history had gained ground rapidly and by mid-Victorian times the spread of popular education and the network of railways which had come into existence had both combined to attract increasing numbers of people into the field and an ever-increasing number of local natural history and scientific societies were founded. But there were still relatively few journals devoted wholly to natural history when the present series of *The Naturalist* began. The proliferation of scientific journals in the present century has been such that few branches of biology are now without their own magazine. *The Conchologist*, *The Lichenologist* and *The Herpetologist* cater for the more esoteric groups; popular branches such as ornithology have several magazines. This trend, though wholly to the advantage of natural history in general has been somewhat less so to journals which seek to cover the whole field since inevitably subscribers prefer those periodicals which devote all their contents to that branch in which they are most interested. But if support for *The Naturalist* is largely due to the loyalty of Y.N.U. members, its prestige and usefulness is attested by the growing number of independent subscribers, institutions and libraries which now receive the journal. A periodical which throughout its history has been "principally for the north of England" (never exclusively for Yorkshire) but which now circulates to 26 overseas countries can justly claim to have built up such a circulation through its merits and the scientific standing of its contents.

The Naturalist is a corner-stone in the structure of the Y.N.U. since it serves both as a medium for the publication of its members' observations and papers, and as the connecting link between the Union and its 40 Affiliated Societies. Our contents have ranged from the more popular fields of botany and ornithology to articles dealing with obscure organisms whose very existence is scarcely known save to specialists. The manner of presentation has also varied from easily readable articles of general interest to technical accounts which make no concessions to the non-specialist and to compilations of records which, though they may have little general interest or appeal, form valuable works of reference. Differences of this kind are inevitable and to alter our scope in the interests of the majority would mean to narrow it and it would be those branches of natural history which are inadequately catered for elsewhere which would suffer most. Underlying the diverse nature and varied treatment accorded to the subjects covered, there has throughout been a constant flow of short field notes, records, local observations and accounts of field meetings of the Y.N.U. and these have not only imparted a distinctive flavour to *The Naturalist* but have collectively built up over the years a huge body of information on the occurrence and distribution in Yorkshire of organisms in most groups of plants and animals. It is a matter for regret that no cumulative index exists to make this information more readily accessible. No Yorkshire naturalist can turn the pages of old volumes of *The Naturalist* without unearthing the details of some forgotten or overlooked record, without chancing upon miscellaneous items of information of great interest or without learning much about bygone naturalists from the scores of obituary notices recording their lives and contributions to natural history.

There can be no fear that the Y.N.U. will not continue in the future as in the past to recruit a succession of keen naturalists; but there has probably been no time in the history of the Union when economic pressures and production costs have been felt more severely than at present and the future threatens to become more rather than less difficult. But the celebration of a centenary is an occasion for looking backwards; for recalling salient facts and achievements and tracing trends and changes over the years. To look forward is a matter of faith.

W.A.S.

THE YORKSHIRE RECORDS OF *EUPHRASIA SALISBURGENSIS*

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ABSTRACT
The possibility of the occurrence of *Euphrasia salisburgensis* in Yorkshire is reviewed in the light of the herbarium sheet (BM), written records, reports of field searches and the author's fieldwork. It is concluded that the plant is probably not there at present and that Lees' records are probably erroneous. The occurrence of *E. scottica* and *E. confusa* x *E. scottica* in the Craven area is described.

EVIDENCE FROM THE LITERATURE AND THE HERBARIUM

The occurrence of *Euphrasia salisburgensis* var. *hibernica* Pugsl. in the West of Ireland is well documented (Townsend, 1896, Pugsley, 1930, Perring and Walters, 1962). The same variety has also been supposed to occur in Yorkshire (V.C.'s 64 and 65). The record is supported by a single herbarium sheet in the British Museum (Natural History) (BM), on which are mounted eight plants which are undoubtedly *E. salisburgensis* var. *hibernica*. The sheet bears a printed label reading 'Herb. F. Arnold Lees, 1905-1921. Purchased 1923'. There is also a label written by Lees, as follows:

> Euphrasia. On the tabular limestone above Outershaw on to Stake Fell over Buckden, N. & Mid West Yorkshire! July 1885 and 6.

To this Lees later added the following in red ink:

> Salisburgensis, Funck. 1944 Oxf. List. Thought at time of gathering (while resident at Hawes) to be a form of gracilis, Fr!

Lees' signature has also been underlined in red, as if to confirm that the addition was made by him.

This record seems first to have been published in 1930 (Druce 1930), but no one but Lees has been able to find *E. salisburgensis* in Yorkshire. I have therefore attempted to clarify the situation by investigating the literature and by going to look for the plant in the field myself.

There are two written records of this find by Lees himself. One is best covered by quoting from Lousley (1950), as follows:

> "The district from Ling Ghyll and Cam Fell to Oughtershaw, to the east at the head of Wharfedale, may hold the key to another mystery of British field botany. The Eyebrights are quite a difficult critical group, but one of the most distinct of them is the Narrow-leaved Eyebright, *Euphrasia salisburgensis*, which occurs in some plenty on the limestones of the west of Ireland. As Praeger remarks, it "is easily recognised in the field by its dwarf bushy growth, characteristic colour, and jagged upper leaves". He adds that the latter assume a beautiful coppery brown colour when the plant grows in exposed places. In Britain it has only been found in Yorkshire (the Devon record is an error) and the finder was F. Arnold Lees.
>
> As I write I have before me Lees' own annotated copy of Dr. G. C. Druce's *British Plant List*, edition 1, which was given to him by the author and eventually found its way into my library. Against *E. salisburgensis*, Lees has written: "Cam, Outershaw and on exposed table limestone to Conistone Cold!" but he never published the record. In his herbarium at the British Museum (Natural History) there are specimens from Oughtershaw and Buckden (farther down the Wharfe Valley) collected in 1885 and 1886 which H. W. Pugsley said exactly match the Irish plants. It will be seen that these place-names extend over a large area of country and it is perhaps not to be expected that the plant will be found again easily. The rediscovery of Narrow-leaved Eyebright in Yorkshire would be a find of first-class botanical importance."

The other of Lees' accounts was written in 1916 for *The Vegetation of Craven in Wharfedale* . . . which was not published until 1939, when it appeared under the editorship of A. A. Dallman. On page 68 of this work we find:

"a few bare and exposed limestone scar lynches and slopes seem to give rise to the Irish *E. salisburgensis* Funck; or something near it, as was to be expected of a district showing its kindred nature in *Arenaria gothica* Fr., *Polygala amara* L., etc. Such places are Cam Fell! Ribbleshead to Selside and Moughton, and Conistone Cold scar scree! But all one's gatherings require authenticating as to name."

This is followed by one of J. F. Pickard's additions, which, according to Dallman's 'Prolegomena' were made "By permission of Dr. F. A. Lees, shortly before his decease." Lees died in 1921, so this particular note was self-evidently not written before his decease:

"*E. salisburgensis* — new to England! *Dr. F. A. Lees.* From Deepdale — Outershaw over towards Wensley. Specimens in South Kensington Museum (**BM**), F.A.L. Has been sought for here in vain since, to 1934, Druce and others. This was named as above by F. A. Lees but unfortunately he died before this occurrence on specimens found by him was proved."

When Druce published the record in 1930 he quoted the wording from Lees' copy of the British Plant List, which he said was in the possession of Mrs. Foggitt, adding "A protracted search on two occasions with Mr. & Mrs. Foggitt failed to find it". In another of Lees' posthumous works, written about 1911 (Lees, 1941), Dr. W. A. Sledge refers to the specimen in BM and comments as follows: "Lees, however, makes no reference to this very important record in his MS., and as many researchers have failed to confirm the record the evidence for the existence of the species in Yorkshire cannot be regarded as entirely satisfactory."

Finally I quote from a letter written to me in 1974 by Mr. J. E. Lousley:

"Since 1930 a great many people have searched for *E. salisburgensis* (in Yorkshire) and especially so since I gave the record extra publicity."

There are several oddities in this story, which should perhaps be enumerated.

The earlier specimens from Lees' collection, some 25,000 in number, were sold to Bradford Corporation and are preserved in **CMM**. The Keeper of Natural Sciences of the Bradford City Art Gallery and Museums, Miss Margaret M. Hartley, has kindly informed me that the Lees collection there contains no specimens labelled *E. salisburgensis*, even tentatively, nor are there any specimens labelled *gracilis* (as they might originally have been) from the localities mentioned in Lees (1939). A possible explanation would be that by 1905 Lees was interested in the further study of this particular gathering, and retained it when he disposed of his herbarium. Pickard's note in Lees (1939) is also odd, as it was written after 1934, contrary to Dallman's introductory remarks, and it gives what is superficially a different locality, though if the place names are compared on a map, it will be found that his locality is equivalent to that given by Lees on the label of his specimen. All Lees' own observations indicate occurrence of the plant over wide areas: thus from Oughtershaw to Stake Fell is 4 or 5 miles (note that he says "and on to Stake Fell") from west to east; Cam is a few miles further west on the same line, while Constone Cold is about 17 miles south-east of Cam! 'Ribblehead to . . . Moughton' also spans several miles, in an area to the south-west of the line from Cam to Conistone Cold. In view of this it is surprising that only a single sample of *E. salisburgensis* purporting to come from Yorkshire has survived. Finally, though it would normally be evident if two gatherings made on different dates, even from the same population, had been combined on one sheet, Lees' specimens show no sign of this, though the label gives '1885 and 6'.

Evidence from Field Observations

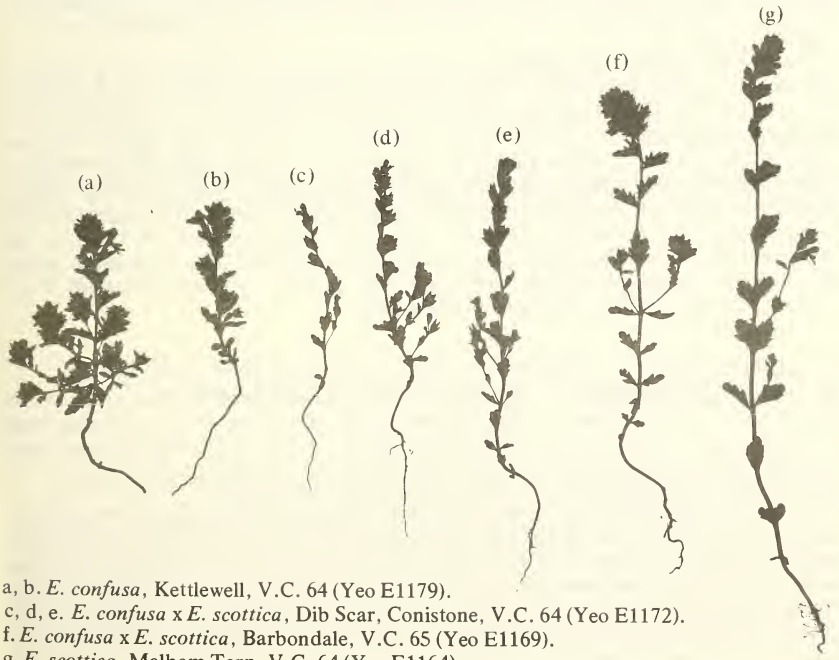
I have made two attempts to find *E. salisburgensis* in the area indicated by Lees, in 1959 and 1971, both unsuccessful. On the first occasion I walked south from Bainbridge in Wensleydale along a track leading to Stake Moss, nearly to Green Scar Top, which borders Stake Moss. *Euphrasia confusa* was common on the south slopes of Addlebrough (34/93-87-) and from Water Ling Pasture (34/93-86-) to near Green Scar Top (34/93-83-), but despite searching around every promising limestone outcrop, I found no trace of *E. salisburgensis*. In 1971 I approached Stake Moss from the south, and collected *E. confusa* in the square (34/93-82-), and again searched round numerous small pieces of almost overgrown limestone

pavement. I also searched crags at Middle Pasture (34/93-80-), a field near Cray (34/93-78-) and rocky banks in Rakes Wood at Buckden (34/94-77-). The high plateau (1,800 feet) at Stake Moss, extends west to Oughtershaw, but after my negative experience, and judging by the appearance of the land, it seemed unpromising to attempt to cover the rest of the terrain indicated on Lees' labels. On my visit I followed Langstrothdale westwards and then went north to Hawes; *E. confusa* was found in the dale and again at Fleet Moss at 1,900 feet.

In 1971 I visited, in addition to the places in the Buckden and Outershaw area already mentioned, the following: 1. MALHAM TARN AREA: limestone pavement above Malham Cove (89-64-), scar near Stanggill Barn (88-69-), Street Gate (90-65-) to Cote Gill (93-69-), Parson's Pulpit (91-68-) and High Mark Brow 63-67-; 2. WHARFEDALE: Dib Scar, Conistone (not near Conistone Cold!) (99-68- and 99-69-), Kilnsey 96-67-; 3. SETTLE: Attermire and Settle Scars (84-64-), near Langcliffe (83-66-), Giggleswick Scar (79-65-); 4. INGLEBOROUGH AREA: Clapdale and Fox Holes near Clapham (74-70-, 75-70-, 75-71-), Souther Scales at Chapel-le-Dale (74-76-). Everywhere I searched short turf and limestone outcrops but, although most of the places are in the area broadly indicated by Lees, I never found *E. salisburgensis*.

The one positive result of this search was that I found plants which were similar to some specimens in Herb. N. D. Simpson and which I previously thought might by hybrids of *E. salisburgensis*. However, having found these at many sites I concluded that most probably they result from crossing between *E. confusa* (Fig. 1a, b) and *E. scottica*.

E. scottica is recorded in the *Critical Atlas* (Perring, 1968) from the 10km square 34/96, a somewhat atypical form having been collected by Dr. M. J. Borrill at Great Close Mire, Malham, in 1952 (Herb. P. F. Yeo). On visiting Malham in 1971 I found *E. scottica* in a more typical state (Fig. 1g), in wet pasture, trampled by cows, at 34/906664 (collected as E1164, in Herb. P. F. Yeo) and on damp slopes at 907660 and 903663. The more or less 'pure' *E. scottica* was even at these sites very much mixed up with hybrid plants, though



a, b. *E. confusa*, Kettlewell, V.C. 64 (Yeo E1179).
c, d, e. *E. confusa* x *E. scottica*, Dib Scar, Conistone, V.C. 64 (Yeo E1172).
f. *E. confusa* x *E. scottica*, Barbondale, V.C. 65 (Yeo E1169).
g. *E. scottica*, Malham Tarn, V.C. 64 (Yeo E1164).

quite abundant. 'Satisfactory' *E. scottica* was also seen at Conistone, mostly in the 1km squares 34/98-67- and 99-67-. The typical state of *E. scottica* has elliptic and obtusely toothed lower and middle leaves, and this shape continues upwards to higher nodes than in the hybrids, while sometimes the leaves have more purple colouring beneath than above.

The more pronounced intermediates between *E. confusa* and *E. scottica* are widespread in Wales, northern England and parts of Scotland, often outnumbering *E. scottica*. Most commonly such hybrids have essentially the habit of *E. scottica*, with long internodes and short divergent branches arising high on the stem, but with slightly less straight stems and less regular branching than usual, while the leaves approach *E. confusa* in having, at the floral nodes, very acute and antrorse teeth, usually numbering three or four pairs. Anthocyanin pigmentation and flower size are rather variable. I collected such plants (Fig. 1f) in 1971 on wet acid ground at the head of Barbondale, V.C. 65, 34/67-86-, and on an area of stony slopes and limestone pavement near Stanggill Barn, between Malham Tarn and Arncliffe, 34/882690 (E1174).

The putative *E. confusa* x *E. scottica* hybrids, whose appearance suggests hybrids of *E. salisburgensis* (Fig. 1c, e), differ slightly from the form described above in having shorter stem internodes, thin, rigid and rather straight stems and branches, small floral leaves with coarse and antrorse but not very finely acute teeth, which often number only two or three pairs, and frequently rather strong anthocyanin pigmentation (Cray, Buckden, 34/936785, Yeo E1173; Dib Scar, Conistone, 34/992682, Yeo E1172). These plants occur in grazed turf around limestone pavement and scars, where the composition of the flora suggests greater dampness than further away from the rocks (presumably caused by run-off), and where the vegetational cover is often incomplete. It seems probable that the prevalent species, *E. confusa*, is less fitted to these conditions than certain derivatives of its hybridization with *E. scottica*, but that the complex of characters selected is different from that selected by the conditions of flushed turf and the borders of rivulets, where this hybrid is usually found. The resemblance to *E. salisburgensis* of the plants found in this situation, which lies in the wiry branches, small, few-toothed leaves and strong pigmentation is, then, purely fortuitous.

As to the occurrence of *E. salisburgensis* itself in this area, two points arising from my field-work can be made. Firstly, this tract of limestone hills is favourable to *Euphrasia*, and the vast area of base-rich grazing land means that *E. confusa* is extremely abundant and widespread; when one sees how successful this species is, it is difficult to imagine another species of similar habit co-existing in the same habitat, or in any small pockets of different conditions that may be found as islets in its general area. Secondly, Lees' note in the *British Plant List* indicates the distribution of *E. salisburgensis* over a wide area, and seems to imply its regular or repeated occurrence through the area indicated, and yet in 1971 no trace of it could be found in careful searching in many localities within this area. I feel fairly certain that in his note Lees was referring unknowingly to *E. confusa*, or at least to certain states of it (and including possibly its hybrids with *E. scottica*).

Conclusion

The evidence from searches for *E. salisburgensis* in Yorkshire since Lees' time, and from the present status of *E. confusa* in the area has led me to the provisional conclusion that *E. salisburgensis* is not today present there, while some of the previously mentioned circumstances surrounding the published reports and the actual specimens, give rise to serious doubts as to whether it was really found there by Lees himself.

If, however, it was not, some explanation must be given for the specimens. It could be, as Mr. Lousley has suggested to me, that in his old age Leeds came across some unlabelled specimens of *E. salisburgensis* of Irish origin which had been sent to him, and somehow associated them with the label now with them, which must itself have become separated from the Yorkshire specimens that it belonged to. I have already pointed out that the sample looks like a single gathering rather than two, although the label indicates that the material was collected in two different years. Of the Irish material of *E. salisburgensis* var. *hibernica*

in **BM**, most of the gatherings are distinguishable, but two resemble the Yorkshire specimen, one being comparatively recent, the other (the type gathering of the var. *hibernica*) having been collected by C. H. Waddell in July 1908, and distributed by the Watson Botanical Exchange Club. The Lees specimen is sufficiently similar to this for it to be credible that it is from the same gathering. A point of resemblance is that Lees' material includes two bitten-off plants. This condition is rare in the **BM** material as a whole but there is one bitten-off plant on the Waddell Sheet — the only gathering in **BM** which was collected early enough for Lees to have been in possession of a duplicate of it.

I suggest that in floristic works a statement on the following lines would cover the situation for *E. salisburgensis* in Yorkshire: "Reported by F. A. Lees to occur over a wide area of Craven and Wharfedale, but not found by anyone else, despite searches. The only herbarium specimen known (Lees, 1885-6, **BM**) is therefore possibly mis-labelled." In a work whose scope does not permit explanation, it would be best to ignore the Yorkshire record.

Acknowledgements

I have pleasure in thanking for their help Dr. M. J. Borrill who collected specimens for me, Miss Margaret J. Hartley who searched for specimens in the Bradford City herbarium, Mr. J. E. Lousley who supplied information and read the manuscript and Dr. W. A. Sledge who has most knowledgeably commented on the manuscript and kindly provided a complementary article, and I am indebted to the late Mr. N. D. Simpson who lent me specimens in 1951 and again in 1974.

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FURTHER COMMENTS ON THE SUPPOSED OCCURRENCE OF *EUPHRASIA SALISBURGENSIS* IN YORKSHIRE

W. A. SLEDGE

The long-unconfirmed claim for the occurrence of the Irish Eyebright *Euphrasia salisburgensis* in Yorkshire has puzzled many botanists. My own interest in the matter dates back more than 30 years and I long ago became convinced that the plant does not and never did grow in Yorkshire. One can only suppose that the **BM** specimens purporting to come from Wharfedale were so labelled in error. Though my conviction cannot be proved there are many deductive reasons for reaching such a conclusion and Dr. Yeo's interesting paper on the subject prompts me to add the following comments in support of my view. I should perhaps add that Dr. Yeo's conclusions concerning the validity of the records, which agree

entirely with my own, were arrived at independently and were not influenced in any way by my own opinions since, prior to the receipt of his paper, we had not exchanged letters on the matter.

1. I have a letter dated 28th December 1930 from J. F. Pickard — Dr. Lees' botanical executor — in which the **BM** *Euphrasia* specimens are referred to. This states: "When Dr. Lees' specimens went to South Kensington, after his decease, and I had been over them thoroughly, I kept a record of the Herb. and what was in it . . . I quote just what I wrote then from the label itself . . . Whether the ? is mine or not I don't know, anyway this is what I wrote in pencil *"Euphrasia salisburgensis. Lees has specimens ? this. Head of Deepdale, over towards Wensley'"*.

This information agrees with Pickard's entry in *Vegetation of Craven in Wharfedale* though I am unable to account for the fact that it does not agree with the data from the label as quoted by Dr. Yeo. But it has been accepted that the head of Deepdale was the precise region from which the specimens were supposed to have been collected and this area has been thoroughly searched by G. C. Druce, T. J. Foggitt and others, all without success.

2. If the specimens were collected in upper Wharfedale in 1885 and 1886 as stated on the label, why were they not mentioned in Lees' *Flora of West Yorkshire* published in 1888? If he "thought at time of gathering" they were *gracilis* Fr., why were they not mentioned under *gracilis* which is included in his *Flora*?

3. Lees was resident in Hawes in 1884-5. If he found the *Euphrasia* on the Wensleydale side of the Wharfe-Ure watershed — and "N. and Mid-West Yorkshire" and "over towards Wensley" clearly imply this — why is there no mention of the plant in an unpublished manuscript "Flora of Wensleydale" compiled by Lees and now in my possession?

4. If Lees found the plant in all the other stations mentioned in *Vegetation of Craven in Wharfedale* viz. "Cam Fell! Ribblehead to Selside and Moughton, and Conistone Cold scar scree!", is it not inexplicable that not one of the many scores of competent botanists who have crossed and recrossed much of this area in the past 90 years should ever have encountered this very distinctive species? Apart from Teesdale no other area in the north of England is more visited by botanists. Lees' concluding statement *(loc. cit.)* that "all one's gatherings require authenticating as to name" is equally inexplicable. No such gatherings are known to exist. For one who kept a herbarium, not to have taken confirmatory specimens of a plant the discovery of which constituted an addition to the British flora is inconceivable. It could be urged that he had encountered hybrid plants like those described by Dr. Yeo and simulating *E. salisburgensis* and that these had led to confusion in his mind; but the absence of any such gatherings in either of his collections lends no support to this view.

5. It is a safe assumption that the records from the several stations other than Deepdale would have been made over a number of years and not all in one year. I have Dr. Lees' field notebooks recording his excursions and listing the species seen on them, covering the years 1870-1881, 1893-1898, 1901-1909 (but not unfortunately the one covering 1885-1886) yet I have found no mention of *Euphrasia salisburgensis* or reference to any problematical *Euphrasia* gathering in any one of these notebooks.

6. If this *Euphrasia* claim were an isolated case my doubts about its validity might be dismissed as no more than inconclusive opinions. But it is not. In my note on *Juncus triglumis* (*Nat.* 24, 1975) I drew attention to Lees' records for *Thalictrum alpinum*, *Salix herbacea, Juncus triglumis* and *Carex capillaris* from Dodd Fell; records which no one has substantiated and for which no confirmatory specimens exist. The fact that specimens of presumed Yorkshire origin do exist in the case of the *Euphrasia* does not rule out the possibility of an accidental transposition of labels.

7. Dr. Yeo makes the interesting observation that of all the *E. salisburgensis* gatherings at BM the Lees specimens match most closely a gathering made by Waddell in 1908 and distributed through the Watson Exchange Club. Dr. Lees sold his herbarium and library to Bradford Corporation in 1906. His second collection consisting of specimens acquired after that date went on his death to South Kensington. Is it not significant therefore that the *Euphrasia* gathering is in London and not at Bradford?

8. After the sale of his herbarium in 1906 Dr. Lees continued to collect the records and specimens of other botanists though his own active field work was largely over. He contributed numerous popular articles on Yorkshire wild flowers to regional guide books, periodicals, newspapers etc. and over the years I have been more and more convinced that in these articles he was prone to romance about some of the plants he claimed to have found. The Dodd Fell plants mentioned above were all recorded in such an article. He became increasingly given in his later years to speculations and theorising about the "assurgence" and "declinance" of species and his *Supplement to the Yorkshire Floras*, which ran to over 1,200 pages of manuscript, was so verbose and so inferior to his earlier *Flora* that it was unpublishable in the form in which it was cast. But Lees regarded this work as a major contribution to regional botany and hence he was more restrained than in his popular articles in the factual if not in the speculative matter which he included. Only so does it seem possible to account for the fact that no mention is to be found anywhere in this work of *Euphrasia salisburgensis*. The original version concluded with three supplementary lists, the first of which covered species not previously recorded in published Yorkshire *Floras*. The only Eyebrights in this list are *E. scottica* and *E. rostkoviana*.

The arguments I have set out point strongly I believe to the conclusion that Lees' records for *E. salisburgensis* as a Yorkshire plant are best regarded as retrospective, *ex capite* imaginings, and that the specimens purporting to come from Deepdale were so labelled in error. I take no pleasure in questioning the credibility of one whose kindness and help to me as a young beginner I recall with gratitude; but it is well that these considerations should be published so that others can reach their own conclusions on the matter.

The Follies of Conservation, by **Arthur Thomas.** Pp. 144 and 8 plates. Arthur H. Stockwell, Ilfracombe, Devon. £1.75 net.

In this extraordinary book Dr. Thomas, once a member of the staff of the Nature Conservancy but now an independent consultant, criticises the principle and practice of conservation in Britain. In particular, he mounts a relentless attack on 'ecologists' and 'conservationists', the tone of which is often either contemptuous, intolerant or intemperate. This violent assault is aimed at a target that is however to a large extent no longer there. Students of British vegetation are now very well aware that the influence of man on our communities has been far more extensive and profound than was realised by a previous generation, and certainly no longer underestimate the importance of soil factors. Those responsible for the management of nature reserves have now learnt by experience that under certain circumstances change can be very rapid and maintenance of a *status quo* can be a subtle and difficult problem.

Inevitably, Dr. Thomas discusses the Upper Teesdale controversy and it is reasonable to examine his treatment of this topic to obtain a measure of the accuracy and fairness of his book. The preservationist case, as it was publicly presented, was indeed open to criticism on grounds of over-statement, but Dr. Thomas goes much too far in his strictures and in so doing makes some fundamental mistakes. Having accepted (reasonably), on the authority of James Backhouse, that a large portion of the upper valley was covered by forest and scrub until the early 18th century, he subsequently concludes that the Teesdale specialities must have arrived after the felling of the forest! He cites in support 'the statement of Raven and Walters that the flora of British mountains is of recent immigration' and thus shows a complete misunderstanding of their interpretation of the origin of our mountain flora and of the different senses in which Quaternary scientists use the word 'recent.' It is also quite absurd to argue that because many continental mountain localities have much richer floras,

the vegetation of Upper Teesdale is not unique. It is certain of the plant *associations* of Upper Teesdale which are truly unique.

The most ironic feature of the Upper Teesdale story is that although it was for so long of the greatest interest to phytogeographers, the area was almost entirely ignored by ecologists until after it became a *cause célèbre*. In spite of Donald Pigott's timely and excellent survey, the paucity of serious published work was undoubtedly extremely damaging to the case for preservation. It is true that, as Dr. Thomas points out with vigour, the Cow Green reservoir has not covered the most important floristic sites, but it remains a monstrous shame that the area had to be molested in this way. However, the whole history of Upper Teesdale is bittersweet, for even now it remains true that botanists and gardeners have done more damage to the rarest plants of the area than anyone else.

It will be abundantly clear that I am not in sympathy with this book, but I nevertheless think it is worth reading, if only because it does force one to re-examine one's own firmly-held opinions; and for all that it has now been formalised and incorporated as an essential feature of Maoist doctrine, in moderation self-criticism remains a valuable exercise. I recommend it to Dr. Thomas.

J.D.L.

An Introduction to Woodland Ecology by **J. Cousens.** Pp. 151 with 40 figures and 13 tables. Oliver and Boyd, Edinburgh. Paperback £1.75: Hardback £3.25.
An Introduction to Heathland Ecology by **C. H. Gimingham.** Pp. 124 with 4 coloured plates, 41 figures and 7 tables. Oliver and Boyd, Edinburgh. Paperback £1.75: Hardback £3.25.
An Introduction to Soil Science by **E. A. Fitzpatrick**. Pp. 176 with 4 coloured plates, 73 figures and 4 tables. Oliver and Boyd, Edinburgh. Paperback £1.75: Hardback £2.50.

These three books are part of a series intended for VIth formers. They are clearly written in non-technical language, are informative about many of the current concepts in ecological thinking and should appeal to naturalists generally. A useful feature is the inclusion of suggestions for projects and practical work. Many of these require little or no expert guidance or laboratory facilities.

Highlights of Dr. Cousen's book include notes on the various types of British woodland and their dominant tree species (Appendix II) and a summary of the problems involved in classifying and ordinating vegetation (Chapter 10). His example of the practical use of ordination should prove especially helpful to anyone wanting to use this technique. Suggestions for practical work are less satisfactory, for despite the inclusion of several practical hints, they are too vague as to objectives.

Dr. Fitzpatrick tells us a great deal about soils, without however inspiring us to become involved with them. The coverage of soil-fertility and land use in Chapter 5 is valuable and the practical exercises and projects given in appendices II and III are excellent examples of good class experiments. The coloured plates are most successful in illustrating different types of soils as seen in the field.

Professor Gimingham's book is also extremely informative. Inevitably, given the importance of heather in heathland vegetation and Professor Gimingham's special interest in this species, most of the work described concerns heather. Chapter 3 on its autecology is especially interesting. The book as a whole indicates the progress which has been made in the study of heaths in general and *Calluna* in particular in the quarter-century since Pearsall's classic *Mountains and Moorlands* was published.

The projects suggested are good, with their objectives clearly stated. The proposed use of rabbits to assay seasonal changes in palatability would be an original way of involving both botanically and zoologically inclined pupils in the same project!

These books then are useful additions to the already numerous introductory works on various aspects of ecology which are now available.

S.C.C.

HEDGES AND ROADSIDE SCRUB OF WALKINGTON PARISH

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During the closing years of the 18th Century and the opening years of the 19th, much of the countryside of East Yorkshire was transformed. This was the period of most rapid enclosure when commoners were deprived of their strips in the great open fields and allocated an equivalent amount of land as one or more compact holding. Each holding had to be enclosed within a year of its being awarded and this was usually done by planting hedges protected by post and rail fences (Wilkinson 1956). About 150 years later much of this work was undone for during the 1960's, as is well known, hundreds of miles of hedges were removed much to the concern of naturalists and conservationists.

The parish of Walkington is unusual however in that very few hedges have been destroyed. If it is assumed that all the field boundaries marked on the first Ordnance Survey map of 1855 were hedges, then at that time there were some 50 miles of hedge in the parish. About 45 miles still survive, most of the destruction having been carried out on farms to the east of the village of Walkington. It has not been possible to survey all of the hedges in detail but so far as can be seen from the roads the majority of them are low and consist largely of hawthorn.

Walkington parish is also of interest because at least until the end of the eighteenth century, it contained parts of what were probably the largest pieces of woodland in the county. One of these occupied the N.W. corner of the parish and covered an area of about 180 acres and the other extended right across the eastern end of the parish (Fig. 1). As a result of a dispute between the lord of the manor and certain commoners of Walkington, these woods were surveyed in 1765. They are also marked on the enclosure map of 1795 and the Ordnance Survey map of 1855. Certain discrepancies occur between the different maps over the names of various parts of the two areas of woodland and these are indicated in Fig. 1. From Fig. 1 it can also be seen that the greater part of each of the woodlands was felled between 1795 and 1855. The area marked as Little Wood on the 1855 map is still woodland though, since it is now composed almost entirely of young ash and sycamore, it appears to have been felled and replanted since 1855, but the last fragment of East Wood has now gone.

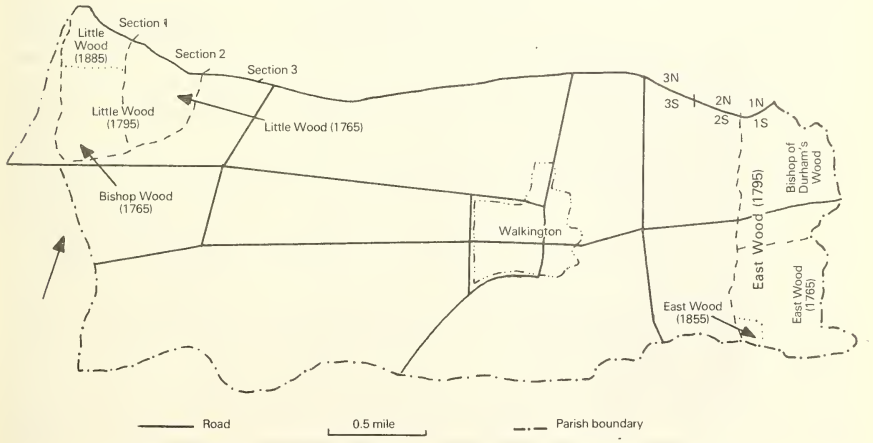


Fig. 1. Map of Walkington parish based on the enclosure map of 1795.

A tarmacadam road skirts the northern side of Little Wood and between it and the wood itself is a strip of tall roadside scrub. This scrub extends eastwards beyond the present Little Wood to a point about 400 yards east of the eastern boundary of the wood as it was in 1795. This scrub is rich in shrubs and trees and, to the east of the present Little Wood, a hedge can be more or less clearly demarcated from the scrub. The road which follows the northern boundary of the parish crosses the northern side of East Wood as marked on the enclosure map of 1795. Hedges occur on both sides of this road, that to the north being the parish boundary and that to the south marking the northern side of East Wood. Other hedges adjacent to the area previously occupied by East Wood have been investigated and it is believed that together they provide a useful basis for an assessment of the composition of the wood.

Geology

The hedges and scrub of the Little Wood area all grow on shallow soils overlying chalk while the hedges of the eastern part of the parish occupy deep soils derived from boulder clay.

The Composition of the Hedges and Scrub

For present purposes the scrub in the neighbourhood of Little Wood has been divided into three sections (Fig. 1) and the species present in each section are listed in Table 1. The sections are as follows:

1. From the N.W. corner of the parish to the N.E. corner of Little Wood as it is at present (List 1).
2. From the N.E. corner of the present Little Wood to the N.E. corner of the Wood as it was in 1795 (list 2).
3. From the eastern end of section 2 to the eastern end of the roadside scrub (List 3).

The hedges adjacent to sections 2 and 3 have been investigated separately (Lists 4 and 5 respectively, Table 1).

The hedges on the northern and southern sides of the road in the north eastern part of the parish also have been divided into three sections (1-3 N and 1-3 S respectively) and the

Table 1

Species composition of sections of roadside scrub and hedges in the N.W. part of Walkington parish.

	Roadside scrub			Hedges	
	1	2	3	4	5
Acer pseudoplatanus	r	r	-	-	-
Corylus avellana	f	o	+	f	r
Crataegus monogyna	f	f	+	f	a
Fagus sylvatica	r	-	-	-	-
Fraxinus excelsior	f	-	+	-	-
Ilex aquifolium	-	-	-	r	-
Prunus spinosa	a	f	+	a	f
Pyrus communis	-	-	+	-	-
Quercus sp.	r	-	+	r	r
Salix caprea	r	-	-	-	-
Sambucus nigra	f	f	+	f	f
Thelycrania sanguinea	r	f	+	r	-
Ulex europaeus	-	-	+	-	-
Ulmus glabra	r	-	-	-	-
Viburnum opulus	o	r	+	r	-

a = "abundant" o = "occasional" f = "frequent" r = "rare"
+ = "present". Used where no assessment of frequency was made.

TABLE 2
Species composition of hedges in the N.E. part of Walkington parish.

	1N	1S	2N	2S	3N	3S	6	7
Acer campestre	o	-	r	-	r	r	x	x
Acer pseudoplatanus	r	r	-	-	-	-	x	x
Corylus avellana	f	r	f	r	-	-	x	x
Crataegus monogyna	f	a	f	a	f	a	x	x
Fraxinus excelsior	-	o	-	-	r	r	x	-
Ilex aquifolium	-	-	r	-	r	-	x	x
Populus tremula	-	-	-	-	-	-	x	-
Prunus spinosa	f	o	f	r	f	-	x	x
Prunus sp.*	-	r	-	-	-	-	-	-
Pyrus sp.*	r	-	-	-	-	-	-	-
Quercus sp.*	-	-	-	-	-	-	x	x
Salix caprea	-	r	-	-	-	-	-	-
Sambucus nigra	r	r	r	-	r	-	x	x
Thelycrania sanguinea	-	-	r	-	-	-	x	-
Ulex europaeus	-	-	-	-	-	-	-	x
Ulmus glabra	r	f	-	-	-	-	-	
Ulmus procera	-	-	-	-	-	-	x	
Viburnum opulus	-	r	-	-	-	-	-	-

Frequency symbols as in Table 1.
*Because these plants do not flower or set seed it was not possible to identify the species with certainty.

species present in each section are listed in Table 2. Sections 1N and 1S extend from the N.E. corner of the parish to the western end of East Wood (1795). The remaining lengths of hedge investigated in this area were each separated at a field boundary into two sections (Fig. 1). Two more species lists are presented in Table 2, one for a hedge which follows the parish boundary and stretches from the road to the S.W. corner of East Wood as it was in 1855 (List 6) and the other which follows part of the western boundary of East Wood (List 7).

Along Sections 1 and 2 of the roadside scrub near Little Wood, a subjective assessment of the relative amounts of the various species was made but this was not possible along section 3 because the scrub was too dense. Of the twelve and ten species recorded in Sections 1 and 3 respectively, eight are common to both; the remaining six species were all rare and sometimes represented by only a single individual. Two noteworthy absentees from Section 2 are oak and ash. Along this section however the scrub is very narrow, little more than the width of a thick hedge and might therefore have received different treatment in the past. Apart from sycamore all of the species present in Section 2 of the roadside scrub were also recorded in the adjacent hedge (List 4) together with oak and holly. The second length of hedge (List 5) was much poorer in species than the adjacent scrub however and two of the components, *Corylus avellana* and *Quercus* sp. (nomenclature follows Clapham, Tutin & Warburg (1962)), were recorded only at the western end.

Of the lists recorded in Table 2, two, 1S and 7, occupy parts of the boundary of East Wood. It is noteworthy that of the total of 18 species listed in Table 2 fifteen occur in 1S and 7 taken together. Except for the *Pyrus* sp., which was not seen in flower, all of the species present along the northern boundary of the parish (1-3N) were also found in the hedge along the southern boundary (List 6). Three species were found along the southern boundary (List 6). Three species were found along the latter which were not found along the former but one of these, *Populus tremula*, was represented by only a single individual. The parish boundary hedge 1N shows some interesting differences from the woodland boundary hedge, 1S, on the opposite side of the road and further west the parish boundary hedge

(2N and 3N) is markedly richer in species than the field boundary hedges on the opposite side of the road (2S and 3S).

According to Hooper (1970) and Pollard, Hooper and Moore (1974) it is often possible to obtain an estimate of the age of a hedge from the mean number of species in 30 yard lengths. The formulae they derive vary somewhat with the area from which the data are obtained but, as a rough approximation it appears that 100 years can be allowed for each species. The mean number of species in consecutive 30 yard lengths of hedges 1N (8 lengths), 1S (9 lengths) and that represented by List 6 (9 lengths) were determined and for each the value was 4.9. No attempt was made to identify species of *Rosa* and unlike the investigations of Hewlett (1973), blackberry was not included. For the two parish boundary hedges this result would suggest that they were established about 500 years ago but it is difficult to envisage what such a result could mean in relation to a hedge bounding a former piece of woodland. It is interesting to note that data given by Pollard, Hooper and Moore (1974) for assart hedges in Shropshire appear to under-estimate the ages of the assarts considerably.

Discussion

Pollard, Hooper and Moore (1974) consider that mixed hedges with woodland herbs are probably woodland relics or old hedges which were close to woodland at one time and Pollard (1973) has concluded that species-rich hedges indicate the composition of the old forests of the area in which they occur. A considerable number of woodland herbs, including *Mercurialis perennis, Allium ursinum, Anemone nemorosa, Arum maculatum* and *Endymion non-scriptus* are associated with the roadside scrub in the Little Wood area and *Endymion non-scriptus* and *Mercurialis percumis*, together with *Urtica dioica* and *Pteridium aquilinum* are associated with hedge 1S. The herbaceous flora of the hedgess represented by Lists 6 and 7 has not been investigated but mixed hedges in neighbouring parishes also contain woodland herbs. It is likely therefore that the scrub adjacent to Little Wood and the hedges in the neighbourhood of East Wood indicate the species composition of the former woodlands at the two ends of Walkington parish.

If this is so, it is surprising to find oak present in Sections 1 and 3 of the scrub near Little Wood and also in the hedge represented by List 4. This shows that on more or less level ground at least, oak is able to grow on the shallow soils overlying chalk and also, perhaps, that it was an important constituent of the old forests of the Wolds.

Of the eight lengths of hedge recorded in Table 2, field maple *(Acer campestre)* is present in six but this species was not recorded from either the scrub or the hedges on chalk in the Little Wood area. This is of interest in connection with the statement of Tansley (1938 p.368) that field maple and elder are the commonest shrubs of Fagetum calcicolum on the Chilterns, though elsewhere (p.373) Tansley states that field maple is frequent in beech-woods especially on the deeper soils towards the bottoms of slopes.

Taken alone, hedge 1S has a rather surprising composition for a woodland boundary hedge. Pollard, Hooper and Moore (1974) state that hazel, maple and dogwood are very common in old woodland in the midland counties but only hazel occurs in List 1S and that is represented by a single plant only. Furthermore not a single oak was found along this hedge. Several elms are present however and it is interesting to note that elms are common trees in two existing fragments of woodland, Shorthill Hag and Swadgery Mere Wood which occupy part of the area formerly known as the Bishop of Durham's Wood (1765 map, Fig. 1). Oak, hazel and maple all occur in List 7, representing a hedge at the N.W. side of East Wood (1965 map, Fig. 1), however, so it is possible that the species composition of the pieces of woodland to the north and south of the B1230 road was markedly different in the past. Perhaps this was the result of different management practices.

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OBSERVATIONS ON A PLANKTONIC CILIATE IN TWO HUMBERSIDE RESERVOIRS

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There are two reservoirs adjacent to Tophill Low pumping station (Grid Ref. TA 071 483) which supply drinking water to Hull. These are the circular High Level Reservoir (HLR) of diameter 400yds, maximum depth 25ft and capacity 170 million gallons; and the D-shaped Low Level Reservoir (LLR) of length 980yds, maximum depth 12.5ft and capacity 200 million gallons. Both reservoirs have vertical concrete sides and a clay bottom. They are filled from the river Hull and are rich in inorganic nutrients and support dense crops of phytoplankton. Especially notable are surface blooms of blue-green algae which occur each autumn.

In October 1973 the tintinnid protozoon *Codonella cratera* Leidy was found during the investigation of net samples of phytoplankton from both reservoirs. This species, in which the body is encased in a characteristic urn-shaped lorica of approximate length 60μm and diameter 45μm, is described by Fauré-Fremiet (1924) under the synonym *Tintinnopsis lacustris* Entz.

Water samples were therefore taken from the margins of both reservoirs on 19 and 26 October 1973. These samples were concentrated × 10 by sedimentation with Lugol's iodine solution and *C. cratera* was counted in 0.1 ml sub-samples of the concentrates (at magnification × 100).

Concentrations of *C. cratera* (with 95% confidence intervals) on 19 and 26 October 1973 were 4,400 (2,753-6,455) per litre and 1,600 (659-2,984) per litre in the HLR, and 4,200 (2,563-6,335) per litre and 16,800 (13,352-20,663) per litre in the LLR. Examples of published maximum concentrations are 32 per litre in Lake Michigan (Eddy 1927), 66 per litre (Chandler 1940) and 3,506 per litre (Davis 1954) in Lake Erie and about 2,000 per litre in Beloe Lake near Moscow (Shcherbakov 1969). Also I have found up to 5,200 per litre in a gravel-pit near Hull (Sangwin No. 2 pond, Grid Ref. TA 104 472). It seems therefore that 16,800 per litre in the LLR on 26 October was something of a record; but this perhaps indicates a lack of quantitative information on *C. cratera* rather than unusual conditions in the reservoir.

Because *C. cratera* was present in both reservoirs in October 1973 I next decided to follow this species throughout 1974. Surface samples were therefore taken at the margins of both reservoirs at about weekly intervals throughout 1974 and a few drops of Lugol's iodine

solution were added as a preservative. *C. cratera* was counted in 10ml of these samples using an inverted microscope (Lund, Kipling and Le Cren 1958).

The results of these counts were disappointing. *C. cratera* was found in only three out of 45 samples from the HLR and eight out of 45 from the LLR (see Table 1) and the highest count was only three individuals in 10ml (= 300 per litre). *C. cratera* was not found in October 1974. It appears therefore that there is considerable variation from year to year in the size and time of occurrence of *C. cratera* populations in these reservoirs.

Table 1. Number of samples per month in which *C. cratera* and *S. viride* were found during 1974.

Month	J	F	M	A	M	J	J	A	S	O	N	D
No. of samples taken from each reservoir	1	4	4	4	3	4	4	4	4	4	4	5
No. containing *C. cratera* (HLR)	0	0	2	1	0	0	0	0	0	0	0	0
No. containing *C. cratera* (LLR)	0	2	1	2	0	1	0	0	0	0	0	2
No. containing *S. viride* (HLR)	1	4	4	1	2	2	0	1	1	1	0	1
No. containing *S. viride* (LLR)	1	3	1	2	1	1	2	1	1	0	2	1

During 1974 however another ciliate was counted which occurred more frequently than *C. cratera*. This species which was about 70-80μm long and 50-60μm wide was tentatively identified, on the basis of preserved material, as the oligotrichid *Strombidium viride* Stein which is described by Penard (1922). It occurred irregularly in both reservoirs throughout 1974 (Table 1); highest counts however were only 12 individuals of 10ml on 14 February in the HLR and 19 in 10ml on 4 April in the LLR.

Virtually no other ciliates of length > 50 μm were found in the 1974 surface samples. Small unidentified spherical ciliates (diameter 20-30μm) and detached peritrichids were however observed from time to time. Rotifers also were observed quite frequently.

I am grateful to the staff of the Yorkshire Water Authority who collected the samples throughout 1974.

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A BACKWARD LOOK AT BRITISH FLORAS

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The origin and history of the British flora is a subject that has always excited great interest among phytogeographers, particularly with regard to certain elements of the flora such as the arctic-alpines and the Lusitanian species. Very much concerned here is the question of the survival of species through the glacial periods. It was made clear by Clement Reid in 1899 that this problem could only be solved by the historical method, that is by tracing the distribution of the species through the various periods of the past. Reid and his wife made a brilliant start to the work but became increasingly concerned with the Tertiary Period and it was not until about 1930 that the Godwins followed the lead given by Von Post in Scandinavia, and Erdtman in the Yorkshire Pennines and began to study the Quaternary deposits of England and Wales. These studies involved the identification of macroscopic fossils such as fruits, seeds and leaves, to give a picture of the local vegetation and also the identification and quantification of the pollen content of the deposit to give a picture not only of the local vegetation and flora but also that of more distant parts. By 1940 Godwin was able to publish a tentative zonation of pollen diagrams for England and Wales and by 1956 enough evidence had accumulated for him to publish his book *The History of the British Flora — A Factual Basis for Phytogeography.* This was a landmark in the study of palaeoecology and historical plant geography and was a great stimulus for other workers. Now in 1975 Godwin has published the second edition* of what will undoubtedly prove to be a classic work.

Since 1956 there has been a notable shift in the objectives of pollen analysis. In the early development of the subject the pollen zones were regarded as synchronous time zones which could be used as a "quasi-chronological reference system" for the period between the last glaciation and the present, thus fulfilling a serious need in biology, archaeology and geology. This role is being taken over by radiocarbon dating which has, however, broadly confirmed the absolute chronologies attributed earlier to pollen zones. Thus palynology is now able to concentrate on its role of supplying identifications of plant taxa and plant communities at past known periods of time. In the first edition of his book, Godwin followed Von Post in attributing the changes between one pollen zone and the next to climatically induced changes in vegetation. Since that time it has come to be realised that although the broad trend of change is undoubtedly caused by climatic shifts the actual time of change in composition of vegetation may be determined by other things such as succession, soil type, geographical location and man. An interesting sequence is seen in the development of ideas about the 'elm decline', usually dated at about 3,300 B.C. Godwin believed, with Iversen, that the elm decline was climatically caused since in Denmark there was also a decline in the warmth-loving ivy. Subsequent work showed, however, that there is a causal connection with the activities of Neolithic man and over the years it came to be accepted that elm declined because of its use as food for cattle and possibly for man, coupled with grazing and subsequent soil deterioration to prevent regeneration in some parts of the country. The elm decline is usually described as broadly synchronous but radiocarbon dates vary by about 500 years on either side of 3,300 B.C. thus getting rid of the problem of simultaneous Neolithic clearance over wide regions of Europe. Very recently (Pennington, 1975) there is a hint that perhaps climate was involved to some extent after all.

During the last twenty years there has been a very great increase in our knowledge of floras of the earlier Pleistocene, particularly of interglacial floras and the Weichselian (last) glaciation. Much of this work has stemmed from Godwin's Department and it shows the increasing intensity of the cold periods culminating in south-east England in actual

* *The History of the British Flora — A Factual Basis for Phytogeography.* 2nd. Ed. by **Sir Harry Godwin.** Pp. x + 541 with 28 plates and 176 text figures and maps. Cambridge University Press.

glaciation during the Lowestoftian period. Knowledge of the floras of the Early Pleistocene is still rather sparse but enough to point the extreme oceanity of the climate. Much more is known about the Middle Pleistocene through studies of the Cromer Forest Beds and a considerable amount of evidence is now available for the last two interglacials, the Hoxnian and the Ipswichian, so that West has been able to devise an interglacial cycle of vegetation from the pre-temperate forest of birch and pine following the glacial period, through the early temperate phase of mixed oak woodland, to the late temperate forests of hornbeam, fir and sometimes spruce, and finally the post-temperate stage with a return to dominance of boreal trees, especially pine, birch and spruce. This scheme when related to the present period (Flandrian) suggests that we are now past the middle of an interglacial period, though the effects of man in the latest phase makes detailed correlation very difficult.

Important though it is to know about interglacial floras it is equally important to know about conditions and floras of the glacial periods. Little is known about the earlier glaciations but knowledge of the Weichselian glaciation has increased greatly in recent years. For this glaciation it is now possible to combine very numerous plant records, with records of coleoptera and often very detailed geological knowledge. All of this can be correlated by radiocarbon dating which extends back almost to the beginning of the period. What emerges from these studies is that the glaciation was not uniformly cold but included warm periods or interstadials such as that at Chelford when, 60,000 years ago, the vegetation was dominated by forest of birch, pine and spruce (the last natural appearance of spruce in this country). Outside these interstadial periods woodland seems to have been absent though there were large communities of dwarf shrubs, particularly arctic willows, juniper and crowberry. There was also more open vegetation with a curious mixture of floristic elements including a northern element with such types as *Oxyria digyna*, a southern element with *Corispermum* (not native now) and *Linum perenne* and a halophytic element including *Glaux maritima*, *Juncus gerardii* and *Suaeda maritima*. Frances Bell explains the presence of these different elements by invoking a very continental climate; hot summers allowing the development of southern species and, combined with permafrost, producing strongly saline soils as in the Lena valley of Siberia to-day. This explanation is at variance with the ideas of Shotton and Coope who place most of the deposits dated between 50,000 and 25,000 B.P. in the Upton Warren interstadial (P = 1950 in radiocarbon dating), arguing that although the climate would have allowed the development of woodland this was prevented by the intensive grazing pressure of mammals such as bison, reindeer and mammoth which were undoubtedly present in large numbers. Whatever the explanation, and the second is, as Godwin says, withough much appeal to ecologists, it can nevertheless be worked out that as much as 42% of the species present in Britain to-day existed here in the full glacial period and that by the last phase of the Weichselian glaciation no less than 60% of the present flora was already in the country.

This bears directly on the question of perglacial survival. Did certain elements of the flora, particularly the characteristic species of the famous 'refugia' like Teesdale and Cwm Idwal, survive in those places through the glaciations or was Britain completely denuded of plants during each glacial period as envisaged in the *tabula rasa* theory? The evidence mentioned above shows quite clearly that the *tabula rasa* theory is quite untenable since all or most of the refuge species were widespread south of the ice sheets during the Weichselian glaciation and over most of Britain during the late Weichselian period. Godwin pointed out some years ago that the refugia are in fact refuges from the forest which developed during the early part of the Flandrian. However this does not answer the question of perglacial survival.

Another group of plants which has attracted considerable attention is the Lusitanian element which grows in the Iberian Peninsula, south-west England and Ireland and includes such species as *Arbutus unedo*, *Erica mediterranea* and *E. mackiana*. It is evident that these species migrated into Ireland at a time when the climate was favourable and the coastline was more or less continuous. Thus it is likely that the species migrated in the early part of an interglacial when the climate had become warm enough and the sea level was still much lower than at present. Since these species and others like *Rhododendron ponticum* have been

found in Hoxnian interglacial deposits in Ireland and the Shetlands the question is did they migrate to these areas after each glaciation or, after the initial migration, did they then survive the glaciations south of the ice sheets or on other ice-free areas (nunataks). It is pointed out that with the greatly lowered sea levels of the glacial periods the mountain chains of Connemara, Kerry and the Pyrenees must have made promontories extending out to the influence of the Gulf Stream and might possibly have provided refugia for the Lusitanian species. Clearly the problem is not yet solved but the interglacial occurrence of what seems to be a relic Pliocene flora in Shetland and the increasing probability that *Corylus*, *Alnus* and *Pinus* became established in Scotland independently of any northward migration from England certainly makes the idea of off-shore refugia more attractive than it used to be.

A large part of the second edition of Sir Harry Godwin's book both in the records section and in the discussion, is concerned with the influence of man on the natural vegetation of this country and with the development of agriculture and husbandry as it can be deduced from the pollen diagrams. The advances made in this field in the last twenty years have been enormous and considerable contributions to archaeological knowledge have been made through the work of Godwin and other British workers, almost all of whom have been influenced by him at some stage. This book will remain as a monument to the foresight and industry of a man who has dominated his subject for the last forty-five years and throughout that time has remained a constant source of help and stimulation to his many friends and colleagues.

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FIELD NOTES

Bullfinch feeding on Welsh Poppy

On 31st July and 1st August 1972 a male and a female Bullfinch *(Pyrrhula pyrrhula)* were observed feeding on the seed heads of Welsh Poppy *(Meconopsis cambrica)* in a garden at Carleton, Pontefract. The capsules of the poppies were methodically stripped segment by segment and at the end of two days not one of many seed heads were found to be untouched.

Ian Newton (in *Finches*, 64-66, 1972) states that the most important seed eaten by Bullfinches are dog's mercury *(Mercurialis perennis)*, wych elm *(Ulmus glabra)*, birch *(Betula)*, bramble *(Rubus)*, nettle *(Urtica)*, docks *(Rumex)* and ash *(Fraxinus)*. On cultivated land the birds take seeds of chickweed *(Stellaria)*, dandelion *(Taraxacum)*, buttercups *(Ranunculus)*, sorrel *(Rumex acetosa)*, sowthistle *(Sonchus)* and fat-hen *(Chenopodium)*. In upland areas heather *(Calluna)* seeds are eaten extensively.

Ralph Chislett in *Yorkshire Birds* records the food for this species as buds and berries of rowan *(Sorbus)* (R. F. Dickens), seed of dog's mercury *(Mercurialis perennis)* (E. W. Taylor), forsythia and seeds of "yellow poppy" (W. F. Fearnley). The present observation confirms this comment.

J. D. Pickup

Dipper Perching in Tree

On Sunday 23rd March while birdwatching with my wife in woods 200yds from the river Nidd near Ripley, a bird high in the treetops caught my eye. Although few leaves were on the trees it was difficult to identify the bird, as it perched quite still about 20ft. high in a sycamore with it's back turned to me. Only when it eventually turned it's head did I realise that it was a Dipper.

A few minutes later it was joined by a second Dipper, both birds perching in passerine fashion with only occasionally a characteristic bobbing movement.

The birds eventually flew off over the wood and then quickly back through the trees in what appeared to be a nuptial flight. They came together eventually dropping to the ground in a tangle of wings and feathers only a few yards from where we were standing. After several seconds they noticed our presence and flew off towards the river.

We later watched them dipping on the river stones, searching for food under-water and generally behaving as Dippers normally do.

G. Thrussell

BRYOLOGICAL SECTION MEETING AT GRASS WOODS

F. E. BRANSON & M. DALBY

The spring meeting of the Bryological Section was held at Grass Woods, Grassington on 26th April, 1975 to examine the moss flora of that part of the Woods belonging to the Y.N.T. as a Nature Reserve. The area covered included below and above Dewbottom Scar and the recently acquired woodland of Gregory Scar.

Three of the party, Messrs. G. A. Shaw, E. Thompson and F. E. Branson worked the area from the path up to Dewbottom Scar, finally scaling the cliff to the top and down to the path again. The area is strewn with boulders and the steep slopes up to the Scar are of loose scree. The dominant moss was found to be *Ctenidium molluscum* which covered most of the boulders. Also on boulders was a fair amount of *Neckera crispa*, *N. complanata*, *Tortella tortuosa*, *Isothecium myurum*, *Campylium chrysophyllum*, *Grimmia apocarpa*, *Hypnum cupressiforme*, and also a little *Ditrichum flexicaule*, *Orthotrichum anomalum*, *Grimmia pulvinata*, *Mnium undulatum*, *Thamnium alopecurum* and *Tortula muralis*. On the ground were quantities of *Hypnum cupressiforme* var *tectorum* (a large, swollen variety of limestone grassland), *Eurhynchium striatum*, Camptothecium lutescens, *Thuidium philibertii*, and small amounts of *Thuidium tamariscinum*, *Rhytidiadelphus triquetrus*, *Hylocomium splendens*, *Mnium hornum*, *Dicranum scoparium* and *Pseudoscleropodium purum*. The scree was very sparse in mosses with *Fissidens cristatus* and a few of those already mentioned. The crevices of the cliff were interesting, and here was found *Tortula subulata* (c fr), *Encalypta streptocarpa*, *Trichostomum brachydontium*, *Barbula unguiculata* and *Weissia microstoma* (c. fr.). The only hepatic seen was *Plagiochila asplenioides*, a small quantity on a boulder.

The remainder of the party scattered over the Reserve and additional species found included *Nowellia curvifolia*, found by Mrs. Gow on a fallen log, *Metzgeria pubescens*, *Anomodon viticulosus*, *Rhynchostegiella tenella*, *Tortula intermedia*, *T. ruralis*, *Scapania aspera* and *Frullania tamarisci* from the boulders and escarpment and *Cirriphyllum crassinervium*, *Plagiothecium curvifolium*, *P. succulentum*, *P. undulatum*, *Brachythecium populeum* and *Eurhynchium swartzii* on tree roots and soil. It was noted that *Orthodontium lineare* was present in fair quantity below Gregory Scar, chiefly round the base of trees, but very little was found in other parts of the Reserve. It will be interesting to see if this species increases in the Wood as it has over much of the county over the last 50 years.

LICHENS FROM THE LEEDS REGION

P. M. EARLAND-BENNETT

During the 1974 Y.N.U. spring mycological foray centred on Leeds, 94 lichen taxa were recorded, 44 and 82 from V.C.'s 63 and 64 respectively. In addition, two species of parasymbiont were recorded. Superficially, these totals might be thought to indicate a thriving flora, but generally this was not the case. A large number of taxa were confined to small areas with ameliorating microclimates and even then were only found sparingly and most frequently in a 'relict' status. With the notable exception of the toxi-tolerant species *Lecanora conizaeoides*, few species were seen on trees and of those that were, many were depauperate and lacking ascocarps. By far the major cause of this impoverishment, both locally (cf. Seaward, 1972a) and nationally (cf. Ferry *et al.*, 1973) is air pollution. The lichens present in the areas studied indicate zones 1-4 on the SO_2 air pollution scale of Hawksworth and Rose (1970).

A number of taxa normally associated with siliceous substrates were found growing on calcareous ones, or on siliceous substrates where there was appreciable lime run-off. Where there was added hypertrophication in these habitats, acidiphilous taxa appeared to be in a better equilibrium with their environment, since a number of taxa were seen in greater quantity and in a better state of development, i.e. larger thalli more frequently bearing sporocarps.

Lecidella scabra was not seen on siliceous substrates (although this would be the case in areas much less affected by air pollution) except where there was lime run-off, but it was only sparsely present and seldom had ascocarps unless there was some degree of hypertrophication. However, this taxon did occur on both 'white-lime' and 'black-lime' mortar and on Magnesian Limestone. This change from acidiphilous to calcicolous is a widespread but little studied phenomenon; the few species which have successfully adapted in this manner, have thwarted extinction. *L. scabra* can be found throughout much of England on calcareous substrates, where air pollution has had a major influence on the lichen flora, i.e. urban and industrial regions, and a study of the distribution of this taxon around the Halifax areas has been made (Earland-Bennett & Seaward, 1974). Other taxa behaving in a similar manner and recorded during the four-day foray included *Bacidia umbrina, Candelariella vitellina, Lecanora muralis, Parmelia saxatilis* and *Trapelia coarctata.*

The following account makes mention only of the most interesting taxa seen at the localities visited between 24-27 May:

Beecroft Moor Plantation (24/5/74)

The first day was most rewarding in terms of numbers of species recorded. The area in and around Beecroft Manor Plantation (44/1753 and 44/1754) was investigated; the route taken was virtually a transect of the southern slope of the valley formed by Gill Beck, descending some 60m. mainly through regenerating *Betula* woodland (although the plantation was primarily coniferous) and through the Millstone Grit boulders strewn over the slope and in the beck itself. Many of these boulders were partially shaded by luxuriant *Vaccinium* and *Calluna* which enhanced survival and enriched the lichen flora, especially on the lower slopes.

The Millstone Grit walls and trees by the roadside at the start of the transect were covered with few species and for the most part by the single species *Lecanora conizaeoides*. However, on descending towards Gill Beck other crustose and also foliose taxa gradually increased on both trees and rocks. At Gill Beck 30 taxa were recorded on the boles of trees and (or) decorticated wood and 52 taxa on low Millstone Grit walls and boulders. The total number of taxa recorded was 72, which is 76.6% of the four-day total.

Many interesting species were seen of which *Cladonia luteoalba* is possibly the most noteworthy since it has long been considered a rare species. Recent recording has, however, shown it to be more common than older records would suggest, both in the British Isles (from

which it was only known until recently) and as a circumpolar species, with three chemical strains (Dahl & Krog, 1970; Östhagen, 1972). The specimens found at this locality (44/175539 and 44/174540) were growing on bryophytes on the tops of partially shaded Millstone Grit walls, which is the typical habitat for this species in this region (cf. Earland-Bennett, 1973).

Other species of interest included a large saxicolous plant of *Micarea melaena* growing on the vertical face of a low Millstone Grit boulder under partial *Betula* shade, together with fertile *Mycoblastus sanguinarius*. On the upper surfaces of this, on nearby boulders and on the boles of various deciduous trees and even fallen twigs, were many well developed thalli of *Parmeliopsis ambigua*, a species which is spreading rapidly throughout Britain (cf. Harksworth, 1974).

Another noteworthy species seen growing on boulders on the valley slope was *Parmelia discordans*, a species which was, until recently, overlooked for *Parmelia omphalodes*. The hard Millstone Grit (=a quartzite in this locality) boulders in Gill Beck yielded a rich assemblage of inundated and aquatic species, including *Lecanora lacustris, L. laevata, Lecidea macrocarpa, L. tumida, Porina chlorotica, Rhizocarpon lavatum, Trapelia ornata* and *Verrucaria aethiobola*. On the partially shaded coping stones of the Millstone Grit wall on the northern side of the beck were a few thalli of *Lepraria zonata*, a species only recently added to the British list (Earland-Bennett & Seaward, 1974).

A number of interesting species were seen on a few old trees of *Acer, Fraxinus* and *Quercus* along the northern bank of Gill Beck. *Calicium viride* (sterile), *Chaenotheca ferruginea* (sterile), *Lecidea scalaris, Micarea lignaria, Mycoblastus sanguinarius* (sterile) and eight other species were seen on two old *Quercus*, and a nearby *Fraxinus* yielded *Pertusaria albescens, Pseudevernia furfuracea* var. *ceratea*, fertile *Mycoblastus sanguinarius* and eight other species.

Species belonging to the genus *Micarea* were recorded on various substrates. *Micarea melaena* and *M. prasina*, both of which are new records for V.C. 64, occurred most frequently on *Betula*. *Bacidia chlorococca* was common on stems of *Calluna* and although it has not previously been published as occurring in V.C. 64, it is not uncommon, especially on *Calluna*, around the urbanized areas of West Yorkshire. Ahti & Vitikainen (1974) report this taxon as being a common lichen in Finland, especially in inhabited areas and even growing in the centre of cities.

Saw Wood (25/5/74)

The second day was spent at Saw Wood (44/3839) to the east of Leeds and beside the busy A64 road. Despite a very impoverished corticolous flora, with *Lecanora conizaeoides* assuming a high percentage cover, except in the denser parts of the wood where green algae were dominant, 22 lichen taxa were recorded. There were no rock outcrops here, but a farmyard wall built of Magnesian Limestone yielded 10 taxa of which the most interesting were *Buellia punctata*, *Lecanora conizaeoides* and *Lecidella scabra*.

Within the wood, the only foliose epiphyte seen was *Hypogymnia physodes*, growing on the exposed roots of an old *Fagus*. The parasymbiont *Muellerella polyspora* was found growing on *Lecidea uliginosa* which in turn was growing on one of the many decayed logs. Also on the latter substrate was a colony of *Cladonia coniocraea* and *C. ochrochlora*. The part of the colony referable to the latter 'species' was growing from the lower and damper part of the log and merged imperceptibly upwards into the part of the colony referable to the 'species' *Cladonia coniocraea* (i.e. podetia with and without scyphae were growing mixed together) the latter being best developed on the top of the log. Mr. P. W. James (in Rose & James, 1974) has recently proved that in Britain at least, these are in fact phenotypic modifications induced by different environmental conditions.

Bretton Park (26/5/74)

The third day was spent at Bretton Park where 44 taxa were recorded, 42 and 22 from grid squares 44/2812 and 44/2813 respectively. The most interesting habitat was an old ha-ha

separating the pasture from the lawns. It was composed of a laminated siltstone, calcareous in places, with a mortared coping which was level with the lawn side so that the lichen flora on the vertical surface of the 'wall' facing the pasture (south) was afforded protection. This was emphasised by the land on the pasture side also rising a few feet from the base of the wall, so that a gully was formed. The latter was obviously used as a constant pathway by the animals and consequently provided considerable hypertrophication. These factors, together with a certain amount of lime run-off from the mortared coping, created a habitat which enabled a number of interesting species to survive in a relict status. The most interesting of these included *Catillaria chalybeia, Haematomma ochroleucum* var. *ochroleucum* and var. *porphyrium* growing side by side, fertile *Lecidella scabra* and *Pertusaria corallina*. Ha-has in other parts of Yorkshire bear similarly interesting relict floras of which the most noteworthy is probably that at Bolton Abbey.

In the pasture, old *Ulmus* stumps provided a suitable substrate for *Caloplaca citrina, Lecanora dispersa* and *Rinodina exigua* (also on the siltstone ha-ha). The siliceous rocks at the edge of the lake yielded *Verrucaria aquatilis* and *Baeomyces rufus. Lecidella scabra, Micarea lignaria, Trapelia coarctata* and *T. ornata* were found on the inundated rocks at the side of the weir under the main bridge. Other species of interest included *Bacidia sabuletorum* and *Xanthoria candelaria* on a concrete wall. Corticolous species were, with the exception of *Lecanora conizaeoides* and *Lepraria incana*, absent.

A Millstone Grit wall with 'black-lime' mortar also proved an interesting habitat; species present on the sandstone coping blocks of the wall were few, *Parmelia saxatilis* and *Lecanora conizaeoides* being dominant. The former, however, more frequently occurred at sandstone and 'black-lime' mortar junctions and also entirely growing on the mortar. A number of other acidiphilous species were confined to this ecological niche including *Bacidia umbrina, Candelariella vitellina, Lecanora muralis, Lecidella scabra* (fertile) and *Trapelia coarctata.* These species form a characteristic assemblage which can be found on 'black-lime' mortar in areas which have suffered from air pollution, and it would appear that the lower pH of this mortar compared with the more common sand and cement 'white-lime' mortar is more acceptable and promotes better growth and fertility.

Meanwood Valley (27/5/74)

The final day was spent in the Meanwood Valley (44/2740, 44/2839 and 44/2840) which is situated in the more rural suburbs of the north of Leeds. Thirty-three lichen taxa were recorded together with the parasymbiont *Phaeospora parasitica*, growing on the thallus and ascocarps of *Lecanora dispersa*. Corticolous species were few and the only foliose taxa present were a few small thalli of *Hypogymnia physodes* and *Parmelia saxatilis* growing on *Salix*. A number of small crustose species were of interest including *Bacidia chlorococca* on *Rosa, Micarea melaena* on *Acer* and *M. prasina* on *Acer, Salix* and *Ulex.*

The most rewarding habitat was a Millstone Grit wall at the bridge over the beck at 44/278402. Species seen on the sandstone coping included *Bacidia umbrina* and *Lecanora intricata* var. *intricata* (a rare species around the West Riding conurbation, cf. Seaward, 1972b). The 'black-lime' mortar of the coping of the Millstone Grit wall at the side of the bridge yielded an interesting assemblage including *Bacidia umbrina, Caloplaca holocarpa, Protoblastenia rupestris, Verrucaria nigrescens* and *V. viridula,* while *Protoblastenia monticola* was found on the 'white-lime' mortar nearby.

In the following table, nomenclature mainly follows James (1965, 1966). Taxa marked with an asterisk and a dagger have not been published as occurring in V.C.'s 63 and 64 respectively by Watson (1946, 1953) or in more recent works (e.g. Seaward, 1972b). Specimens now housed in the herbarium at Bankfield Museum are suffixed by the letters HFX. This data is also incorporated in the Biological Data Bank, West Yorkshire Region, Cliffe Castle Art Gallery and Museum, Keighley. The table lists the taxa recorded from the eight eight one-kilometre squares studied together with habitat details.

Localities: 1, Beecroft Moor Plantation (44/1753); 2, Beecroft Moor Plantation (44/1754); 3, Saw Wood (44/3839); 4, Bretton Park (44/2812); 5, Bretton Park (44/2813); 6, Meanwood valley (44/2740); 7 Meanwood Valley (44/2839); 8, Alwoodley (44/2840).

Habitats: A, Sandstone and siltstone walls, outcrops and boulders not markedly influenced by lime or hypertrophication; B, mortar and siliceous rock contacts and (or) siliceous rocks (+ or - on soil) immediately below mortar and (or) concrete (+ or - affected by hypertrophication); C, 'black-lime' mortar; D, 'white-lime' mortar and concrete; E, corrugated asbestos-cement sheeting; F, Magnesian limestone wall; G, sandy and peaty soils, decaying vegetation and bryophytes (+ or - over siliceous rocks and boles of trees); H, deciduous trees and shrubs; I, coniferous trees; J, decorticate wood.

	Localities								
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Habitats**
Acarospora fuscata		X		X		X			AB
A. smaragdula	X			X					B
†*Bacidia chlorococca* HFX	X					X			H
B. sabuletorum HFX				X					D
B. umbrina HFX			X	X	X	X			ABCDJ
Baeomyces rufus		X		X					AB
Buellia punctata HFX		X	X						FH
Calicium viride HFX		X							H
Caloplaca citrina	X	X	X	X	X	X		X	ABCDFJ
C. holocarpa	X		X	X	X	X			CDEF
Candelariella aurella	X		X	X	X	X		X	BDE
C. vitellina		X		X	X	X			BCDE
Catillaria chalybeia HFX		X		X					B
C. griffithii		X							H
Chaenotheca ferruginea		X							H
Cladonia chlorophaea s.l. HFX	X	X				X			GJ
C. coccifera	X	X		X	X	X			G
C. coniocraea	X	X	X	X	X	X	X		GHJ
C. digitata	X								G
C. fimbriata	X	X	X	X	X	X			GHJ
C. floerkeana	X		X	X		X			G
C. luteoalba HFX	X	X							G
C. macilenta		X		X					GH
C. ochrochlora	X		X						J
C. polydactyla	X	X	X						GHIJ
C. squamosa	X	X				X			GHJ
Cornicularia aculeata	X								G
C. muricata	X								G
Fuscidea cyathoides	X	X							A
Haematomma ochroleucum									
v. *ochroleucum*				X					B
* v. *porphyrium* HFX				X					B
Hypogymnia physodes	X	X	X			X			AGHIJ
H. tubulosa HFX	X	X							AH
Lecanora badia HFX		X							A
L. conizaeoides	X	X	X	X	X	X	X	X	ABFHIJ
L. dispersa	X	X	X	X	X	X		X	BCDEFJ
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	

Species	Localities 1	2	3	4	5	6	7	8	Habitats
Lecanora expallens		X							H
L. intricata v. *intricata* HFX						X			A
v. *soralifera*	X	X				X			A
L. lacustris HFX		X							A
†*L. laevata* HFX		X							A
L. muralis				X	X				ABCDE
L. polytropa		X		X		X			A
Lecidea albocaerulescens						X			A
L. granulosa	X	X	X	X	X	X	X		ABDGHIJ
L. lucida	X			X					AB
L. macrocarpa		X							A
L. quernea		X							H
L. scalaris HFX		X							HJ
L. sulphurea HFX		X							A
L. tumida	X	X		X		X			A
L. uliginosa	X	X	X	X	X	X	X		AGHIJ
Lecidella scabra HFX			X	X	X				BCDF
L. stigmatea HFX			X						D
Lepraria incana	X	X	X	X	X	X	X		ABGHIJ
†*L. zonata* HFX		X							A
Micarea lignaria HFX		X		X					AH
†*M. melaena* s.l. HFX	X	X				X			AGH
†*M. prasina* HFX	X					X			H
Mycoblastus sanguinarius HFX	X	X							AH
Ochrolechia androgyna	X	X							AH
†*Parmelia discordans* HFX	X								A
P. omphalodes	X								A
P. saxatilis	X	X		X	X	X			ABCDHJ
P. sulcata	X								H
Parmeliopsis ambigua HFX	X	X							AHJ
Pertusaria albescens HFX		X							H
P. corallina	X	X		X					AB
Physcia ascendens					X				E
P. caesia					X				E
P. orbicularis				X	X				DE
P. tenella				X					BD
Platismatia glauca HFX	X	X							AGHJ
Porina chlorotica HFX		X							A
Protoblastenia monticola HFX						X			D
P. rupestris HFX						X			C
Pseudevernia furfuracea v. *ceratea*	X	X							AHJ
Rhizocarpon geographicum s.l.	X								A
†*R. lavatum* HFX		X							A
R. obscuratum		X							A
R. oederi HFX		X							A
	1	2	3	4	5	6	7	8	

Species	Localities 1	2	3	4	5	6	7	8	Habitats
**Rinodina exigua* HFX				X					BJ
R. subexigua		X	X	X	X			X	BD
Sarcogne regularis	X								D
Trapelia coarctata		X		X	X	X			ABC
T. ornata HFX		X		X					A
Verrucaria aethiobola HFX		X							A
**V. aquatilis* HFX				X					A
V. hochstetteri				X					BD
V. muralis	X	X		X					BD
V. nigrescens			X			X			CDF
V. viridula			X	X		X		X	CD
Xanthoria candelaria HFX				X					D
X. parietina			X	X	X	X			BDEF
	1	2	3	4	5	6	7	8	

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WOODLICE OF AIREDALE, WHARFEDALE AND WENSLEYDALE

DOUGLAS T. RICHARDSON

> ". . . I need only mention Arachnida, Myriapoda, Crustacea and Annelida. Who will take charge of these 'Neglected Orders' and tell us something about their wonderful forms and life histories? . . ."
>
> H. Franklin Parsons *Naturalist* 1878

Parsons would indeed be a disappointed man were he alive today for despite the fact that British Woodlice, as a whole, have received adequate publicity (Cloudsley-Tompson & Sankey, 1960; Edney, 1954; Sutton, 1972), records of species found in Yorkshire which have found their way into the pages of the *Naturalist* are few and far between — thirteen brief references in a span of 100 years can hardly be described as an enthusiastic response.

Today there is no excuse for either the amateur or professional naturalist to ignore this interesting group for any mystique which may have surrounded woodlice has more than been dispelled by Sutton's (1972) excellent book. It was the reading of this book and a chat with the author himself which convinced me that here was a group worthy of further attention.

My collecting has, so far, been confined to Skipton, Barnoldswick, and East Marton areas in the northern tip of vice-county 63; Ilkley, Skipton, Buckden, Grassington, Malham, Bolton Abbey, Gisburn areas in the western sector of vice-county 64; and West Witton, Thoralby, Hawes in the southern part of vice-county 65. It is not claimed that the list which follows represents the total number of species which exists in these areas but it is hoped that it will perhaps help to redress the deficiency which the far-thinking Parsons attempted to prevent.

The check list of British species of Woodlice lists 42 species, of these only 29 can be regarded as truly native and out of these only 6 species have a widespread distribution.

TRICHONISCIDAE

Androniscus dentiger Verhoeff 6mm., colour ranges from white to an attractive deep rose. Under stones, wood, etc., on gardens and waste ground. Relatively common.

(63) Skipton, Calton Terrace (34/95) under old timber and stones on garden, 8/4/73.

(64) Gisburn, Ellenthorpe (34/84) under stones on waste land, 15/3/75.

Trichoniscus pusillus agg. (Brandt) 3.5-5mm., reddish-brown in colour. A very abundant species which is overlooked because of its small size. Two forms occur, *T. pusillus pusillus*, the parthenogenetic triploid form and *T. pusillus provisorius*, the bisexual form. Females of the two forms cannot be separated with confidence and as all the specimens collected were females they are designated *T. pusillus* agg. Found in a great number of habitats in litter, under stones, logs.

(63) Carleton, Ravenshaw (34/94) in litter, 17/3/74; Skipton, Snaygill Ings (34/94) under log, 6/4/74; East Marton, Netcliffe Hill (34/95) under timber, stones, 29/12/74; Barnoldswick, Greenber Field Lock (34/84) under logs, stones, 23/3/75; Carleton, Heslaker Lane (34/95) under stones, 23/3/75; Skipton, Carleton Road, railway embankment (34/95) under stones, timber, 6/4/75.

(64) Kilnsey, Sleets Gill (34/96) under stones, 29/5/73; Grassington, Grass Wood (34/96) under stones, logs and in litter, 4/6/73; 28/10/73, 30/3/75; Hawkswick, Cote Gill (34/97) under stones, 23/9/73; Bolton Abbey, Lud Stream Brow (44/05) under stones, 27/10/73; Deepdale, Calf Barn (34/87) under stones, 31/3/74; Airton, Scotsthrop Lane (34/85) under stones, 26/5/74; Hawkswick, Knipe Scar (34/97) under stones, 22/6/74; Hubberholme, Todd's Wood (34/97) under litter, stones, logs, 18/8/74; Bolton Abbey Woods (44/05) under stones, 21/9/74; Hetton, Boss Moor (34/96) under stones, 2/3/75; Kettlewell Gill (43/97) under bark, 8/3/75; Bolton-by-Bowland (34/74) under stones, in litter, 15/3/75; Gisburn,

Ellenthorpe (34/84) under stones, logs, 15/3/75; Grunsagill, Cracoe Hill (34/75) under stones, logs, bark, old wood, 28/3/75; Gisburn Forest (34/75) under stones, 28/3/75.

(65) West Witton, Moor Bank (44/08) under stones, 16/3/75; Thoralby, Cross Lane (44/08) under stones, 16/3/75.

Trichoniscus pygmaeus Sars. Our smallest woodlouse, 2.5mm., white. Widespread but seldom reported because of its size and habits; soil species usually found under stones, wood and in deep litter.

(63) Skipton, Calton Terrace (34/95) under old timber on garden, 20/5/73, 29/10/73; Carleton, Ravenshaw (34/94) in litter, 17/3/74; Barnoldswick, Greenber Field Lock (34/84) under stones, 15/3/75.

(64) Kilnsey, Sleets Gill (34/96) under stones, 29/5/73; Grassington, Grass Wood (34/76) under logs, under stones, in litter, 28/10/73; Deepdale, Calf Barn (34/87) under stones, 31/3/74.

Haplophthalmus mengei (Zaddach) 4mm., dirty white or cream. Rare — very few records. Under stones, wood and in soil.

(63) Skipton, Calton Terrace (34/95) under old timber on garden, 8/4/73, 29/10/73.

(64) Grassington, Grass Wood (34/96) under rotting log, 4/6/73; Bolton Abbey, Lud Stream Brow (44/05) under stones, 27/10/73.

ONISCIDAE

Oniscus asellus Linnaeus Our most common species, distributed throughout the British Isles. 16mm. In rotting wood, under stones, gardens, waste heaps, etc.

(63) Skipton, Calton Terrace (34/95), 8/4/73; Elslack, Clogger Lane and Acre Gill Wood (34/95), 28/5/73; Skipton, Snaygill Ings (34/94), 6/4/74; East Marton, Netcliffe Hill (34/95), 29/12/74; Barnoldswick, Greenber Field Lock (34/84), 15/3/75. Skipton, Carleton Road (34/95), 23/3/75; Skipton, Calton Terrace, railway embankment (34/95), 6/4/75.

(64) Rylstone, Bridle Path (34/95), 17/4/73; Skipton, Tarn Moor Bridge (34/95), 19/5/73; Ilkley, Sutbham Wood (44/14), 20/5/73; Kilnsey, Sleets Gill (34/96), 29/5/73; Giggleswick, Lumb (34/76), 2/6/73; Hawkswick, Cote Gill (34/97), 23/9/73; Deepdale, New House (34/87), 3/10/73; Bolton Abbey, Lud Stream Brow (44/05), 27/10/73; Grassington, Grass Wood (34/96), 28/10/73, 30/3/75; Deepdale, Calf Barn (34/87), 31/3/74; Bell Busk, Reek House Hill (34/85), 30/3/74; Skipton, Stirton-Gawber Lane (34/95), 4/5/74; Airton, Scotsthrop Lane (34/85), 26/5/74; Hawkswick, Knipe Scar (34/97), 22/6/74; Hubberholme, Todd's Wood (34/97), 18/8/74; Bewerley, Middle Tongue Bank (44/16), 26/8/64; Malham, Lang Scar (34/86), 27/8/74; Malham Lee Gate (34/96), 27/8/74; Bolton Abbey Woods (44/05), 21/9/74; Goredale Scar (34/96), 27/8/74; Kettlewell Gill (34/97), 8/3/75; Buckden Gill (34/97), 8/3/75; Bolton-by-Bowland (34/74), 15/3/75; Gisburn, Ellenthorpe (34/84), 15/3/75; Grunsagill, Cracoe Hill (34/75), 28/3/75; Gisburn Forest (34/75), 28/3/75.

(65) Bishopdale Lane (34/98), 18/8/74; Hawes, Snaizeholme Bridge (34/88), 26/9/74; Thoralby, Cross Lane (44/08), 16/3/75; West Witton, Moor Bank (44/08), 16/3/75.

Philoscia muscorum (Scopoli) 11mm. A very attractive, very common species under stones, wood, hedge bottoms and similar dry places.

(63) East Marton, Netcliffe Hill (34/95) under stones, 29/12/74; Skipton, Carleton Road (34/95) under stones in hedge bottom, 23/3/75; Carleton, Heslaker Lane (34/95) under stones, 23/3/75; Skipton, Calton Terrace, railway embankment (34/95) under stones, tins, old timber, 6/4/75.

(64) Bell Busk (34/85) in hedge bottom, 30/3/74; Skipton, Stirton-Gawber Lane (34/95) under stones in hedge bottom, 4/5/74; Airton, Scotsthrop Lane (34/85) under stones, 26/5/74.

(65) Thoralby, Cross Lane (44/08) under stones, timber, 16/3/75.

PORCELLIONIDAE

Porcellio scaber Latreille. 17mm., as common as *Oniscus asellus* but can often be found in drier places. Abundant in gardens, waste ground, under stones, etc.

(63) Carleton, playing fields (34/94), 23/3/73; Skipton, Calton Terrace (34/95), 31/3/73); Elslack, Clogger Lane and Acre Gill Wood (34/94), 28/5/73; Skipton, Snaygill Ings (34/94), 6/4/74; East Marton, Netcliffe Hill (34/95), 29/12/74; Carleton, Heslaker Lane (34/95), 23/3/75; Skipton, Carleton Road (34/95), 23/3/75.

(64) Rylstone, Bridle Path (34/95), 17/3/73; Kilnsey, Sleets Gill (34/96), 29/5/73; Hawkswick, Cote Gill (34/97), 23/9/73; Deepdale, New House and Calf Barn (34/87), 3/10/73, 31/3/74; Giggleswick, Lumb (34/76), 11/5/74; Hawkswick, Knipe Scar (34/97), 22/6/74; Buckden Gill (34/97), 7/7/74; Hubberholme, Todd's Wood (34/97), 18/8/74; Bewerley, Middle Tongue Bank (44/16), 26/8/74; Malham, Lang Scar (34/86) and Malham, Lee Gate (34/96), 27/8/74; Bolton Abbey Woods (44/05), 21/9/74; Goredale Scar (34/96), 27/8/74; Hetton, Boss Moor (34/96), 2/3/75; Grunsagill, Cracoe Hill (34/75), 28/3/75.

(65) Kidstones, Causeway (34/98), 16/3/75; Thoralby, Cross Lane (44/08), 16/3/75; West Witton, Moor Bank (44/08), 16/3/75.

Porcellio spinicornis Say. 12mm., occurs on limestone walls, quarry faces, old ruins and walls where mortar or lime has been used. Moderate distribution.

(63) Skipton, Calton Terrace (34/95) in crevices in brick and concrete out-building and on brick and mortar wall, 8/4/73, 4/6/73.

(64) Hawkswick, Cote Gill (34/97) under stones on limestone fell, 23/9/73.

ARMADILLIDIIAE

Armadillidium pulchellum (Zencker) 3.5mm., native; very rare; rediscovered in 1971 in southern Lake District, amongst Juniper on limestone (Sutton, 1972).

(64) Buckden Gill (34/97), 2♂♂, 3♀♀ under stones on unstabilised limestone scree, 7/7/74.

SUMMARY

	VC			10 KM SQUARE																
				34 (SD)													44 (SE)			
	63	64	65	74	75	76	84	85	86	87	88	94	95	96	97	98	05	08	14	16
Androniscus dentiger Verhoeff	*	*					*						*							
Armadillidium pulchellum (Zencker)		*													*					
Haplophthalmus mengei (Zaddach)	*	*											*	*			*			
Philascia muscorum (Scopoli)	*	*	*					*					*					*		
Oniscus asellus Linnaeus	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Porcellio scaber Latreille	*	*	*		*	*			*	*		*	*	*	*	*	*	*		*
Porcellio spinicornis Say	*	*											*		*					
Trichoniscus pusillus agg. (Brandt)	*	*	*	*	*		*	*		*		*	*	*	*		*	*		
Trichoniscus pygmaeus Sars	*	*				*	*			*		*	*	*						

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Grzimek's Animal Life Encyclopedia Vol. 6 Reptiles. Pp. 589. **Vol. 12 Mammals** III. Pp. 657. Each with numerous colour plates, sketches and distribution maps. Van Nostrand Reinhold Ltd. £12 each.

This Encyclopedia, under the general editorship of Dr. Bernhard Grzimek the distinguished Director of the Frankfurt Zoological Garden, runs to 13 volumes. More than 200 scientists in all parts of the world have contributed to it. It is comprehensive, up-to-date, admirably illustrated and beautifully produced. The emphasis throughout is on the living animal and its behaviour patterns, the various contributors usually being zoologists with a first-hand, field knowledge of the groups they describe. For many years the World Wildlife Organization has been striving to save rare animals now so reduced in numbers as to be in danger of extinction. Conservation problems are also a recurrent theme in this work where all too often one is confronted with information concerning the drastic reductions which have taken place in populations of many species.

The volume on Reptiles covers most species of turtles, crocodiles and alligators, tuataras, iguanas, lizards and snakes. There is also a preliminary chapter on Ancient Reptiles. The mammal volume covers the carnivores, pinniped seals and sea lions, ungulates and lagomorphs. There are accounts of the phylogeny of each group and special topics such as myxomatosis in rabbits and the relationship of domesticated strains to wild species in horses and dogs are discussed. Konrad Lorenz contributes, with Viktor Goerttler, an account of behaviour in domestic dogs and, in collaboration with Herbert Wendt, behaviour of the house eat. The text of both volumes is not merely informative, it is also eminently readable and the wide margins of the pages are well supplied with sketches and maps showing at a glance the distributions of the various species.

THE GATEKEEPER BUTTERFLY IN YORKSHIRE

MARTIN LIMBERT

A glance at the Rhopalocera volume of the *Provisional Atlas of the Insects of the British Isles* (Heath, 1970) shows that most British records of the Gatekeeper butterfly *Pyronia tithonus* lie south-east of a line stretching from the Humber estuary to Swansea Bay. The species does occur to the north-west of this line as the Atlas shows, especially on the western coast as far as the Morecambe Bay area. The county of Yorkshire therefore is only marginally within the present range of the species; it is shown as occurring since 1960 in the Kilnsea area and along the geographical boundary of Yorkshire from Trentmouth to the area of Bawtry.

The butterfly is essentially therefore one of lowland Britain and is attracted to grassy rides in woods and hedgerows, especially where bramble *Rubus* abounds. Also the species does not seem particularly averse to land on the coast. This is reflected in the Yorkshire distribution, a more detailed elucidation of which appears in two publications associated with the Yorkshire Naturalists' Union, namely G. T. Porritt's *List of Yorkshire Lepidoptera* (1904) and *The Lepidoptera of Yorkshire: Macro-lepidoptera*, by members of the Lepidoptera Committee of the Y.N.U., which appeared in *The Naturalist* between 1967 and 1970.

Under *Satyrus tithonus*, Porritt lists the butterfly as occurring abundantly at Raskelf and Whitby, occurring commonly at Bridlington, Hunslet, Methley and Scarborough, and without comment at Askham Bog near York, Bishop's Wood near Selby, Bramham, Filey, Redcar, Sheffield, Thorner and Wakefield, and in the supplement Porritt lists in addition Wheatley Wood (Doncaster), Everingham, Grassington and Thorne, and the Gatekeeper was described as being common at the latter. Porritt added a sentence stating that the species was common in the lanes on the east coast but was less plentiful in other districts.

These old records fall into a basic pattern, with occurrences on the Yorkshire coast and in south-central Yorkshire. The one exception is the Grassington station; although in the area habitats seem superficially suitable, I regard this record with some suspicion since it does not fit the established pattern of occurrences. Possibly there was some confusion in vernacular names. The recorder naming the Gatekeeper may have been confused in that *Pararge megera*, usually now called the Wall, was once also known as the Gatekeeper. Morris for example in his volume *A History of British Butterflies* (1876), when referring to the Gatekeeper, actually means *Pararge megera*. Certainly this latter species is the more widespread of the two in Yorkshire.

The more recent statement by the Y.N.U. Lepidoptera Committee (up to 1970) lists a number of sites: Holme-on-Spalding-Moor (1965), Kilnsea (mis-spelt Kilnsey) (1965), Skipwith (one on 8th August 1953), Market Weighton (fair numbers in 1968) and Thorne Moor (1965); recorded "formerly" also at North Cave. The butterfly's status was summed up as "less common than formerly; now restricted to very few localities". A recent paper by B. R. Spence and S. L. Sutton in *The Naturalist* entitled "The Macro-lepidoptera of Spurn Head E. Yorkshire", confirmed the continuance of the Kilnsea station.

The most significant feature of this recent statement is the apparent contraction of the range of the species both south and east. It was listed by Porritt as far north as Redcar and as far west as Hunslet and Sheffield (excluding Grassington). The Lepidoptera Committee of the Y.N.U. puts its most northerly record as Market Weighton and its most westerly (assuming the Skipwith specimen in 1953 to be deliberately released or a vagrant) that of Holme-on-Spalding-Moor. Why has there been this apparent contraction of range and subsequent extinction of certain colonies? Four reasons are obvious:

(i) Extension of built-up areas.
(ii) More efficient farming involving increased use of chemical sprays and the uprooting of hedges.
(iii) A modern-day view that is all too common that woodland (with or without grassy rides) is unproductive and should be felled and converted to a more "useful" purpose.
(iv) Destruction of pupae by grass-cutting, especially along roadside verges.

Perhaps less apparent but nevertheless far-reaching is a gradual climatic change. Between 1900 and 1933 winters became warmer and wetter with fewer severe frosts in spring whilst the summers were very slightly cooler and drier. From then until 1940 the summers were warmer on average than at any other time during this century. Since then temperatures have apparently deteriorated and this may well be causing the temperature-sensitive Gatekeeper to move south thus reducing its numbers as it can only maintain itself in a more restricted area. There can be no doubting that it is easily susceptible to lower temperatures since it occurs at no more northerly latitude in Europe than it does in England and any climatic change would certainly affect the species here first and especially on the extremes of its range as in Yorkshire.

Parallel examples of this reaction to climatic change have been published recently. For example the editor of *The Naturalist* appended a footnote to a recent field-note by E. Crackles entitled "The Monkey Orchid in Yorkshire" regarding the Lizard Orchid *Himantoglossum hircinum*. Bearing in mind the climatic changes briefly outlined above there has been a decrease in the number of stations for the Lizard Orchid in Britain from a peak of more than 130 localities in 66 10-km. squares up to 1940, to 12 localities in the 1950's and 9 stations now.

One may also instance the increase in the number of northern-breeding species of birds now breeding further south in Great Britain, epitomised by the Snowy Owl *Nyctea scandiaca* in Shetland but also including birds like Fieldfare *Turdus pilaris* and Wood Sandpiper *Tringa glareola*. This is associated presumably with the cooler summers allowing conditions demanded by these birds in the breeding season to occur at lower latitudes, the same changing conditions which in all probability are beginning to push the Gatekeeper south. Whether the trend in Yorkshire is reflected elsewhere remains to be seen.

It seems reasonable to suggest that the extreme south-east of the county remains and has been in the recent past the normal limit of the Gatekeeper and the other stations in Yorkshire have been the extremes reached in more optimum conditions. In the south-east, Wheatley Wood near Doncaster, and Thorne were detailed by Porritt as stations and in the more recent country list the only locality given for all V.C.63 is Thorne Moor. Indeed the situation with regard to the Gatekeeper in the south-east of the county bears no relation to the published records. I have made enquiries regarding the species in south and south-east Yorkshire; no records are known by the Lepidoptera recorders of the Sorby Natural History Society and Rotherham Naturalists' Society. One record is known to the Goole and District Natural History Society and this, together with those records for the Doncaster and Thorne areas, is listed below.

1. The Thorne area

(a) The East Ings and Balnecroft Common area; up to 7 noted in July and August 1973 (per Mr. C. Wall).

(b) Thorne Moor; recorded in 1965 and I have observed the species in the Moor area since 1971. Several parts of the Moor boundary have colonies, especially the western edge. Also the species was noted in 1972 just to the north of Thorne Moor along Swinefleet Warping Drain (per Mr. A. Shaw). The species has also been noted on the Moor proper, including the Shoulder O' Mutton Well area. Numbers counted in any one day have usually been below six but 1974 provided a count of about 17 on 5th August and 13th August (latter by Mr. C. Wall).

(c) Crowle Moor (contiguous with Thorne Moor and only partially in Yorkshire) had two specimens on 30th July 1972.

2. The Hatfield area

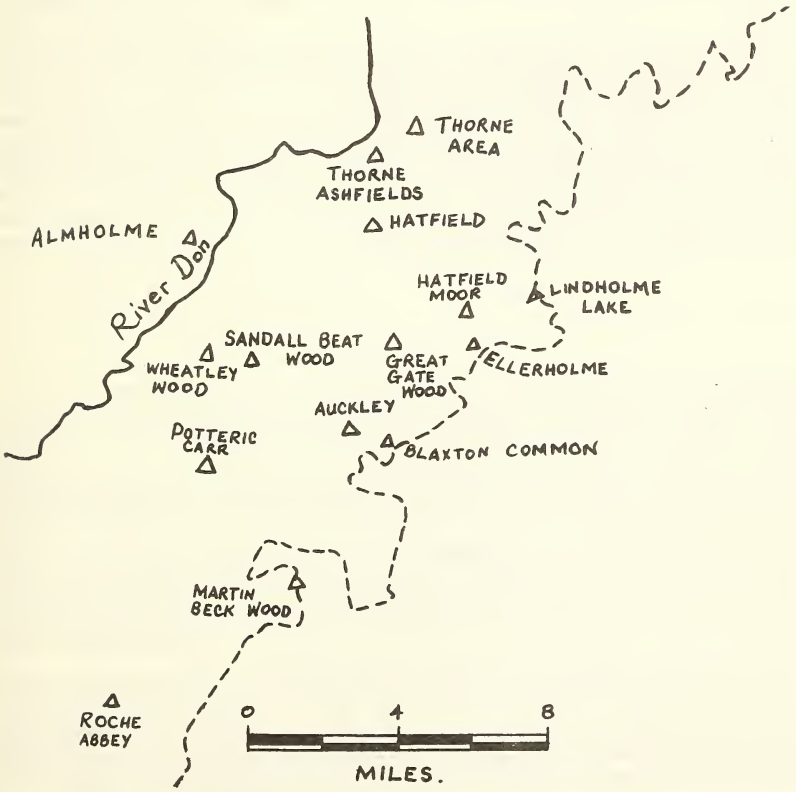
(a) Firth Hills one on 9th August 1974.

(b) Great Gate Wood six in a clearing on 7th August 1974.

(c) Hatfield Moor; one in the collection of Mr. I. Heppenstall is dated 20th July 1959 and labelled "Hatfield Moor". The species has also been noted on the periphery of Hatfield Moor fairly recently at Lindholme Lake (West Carr), which is partially in Lincolnshire,

and at Ellerholme in the south, both on the 28th July 1969 (both the latter from Doncaster Museum records).

3. Sandall Beat Wood, near Armthorpe.
   Taken in 1970 (Doncaster Museum record).
4. Wheatley Wood. (Felled to make way for the new Intake estate).
   Recorded by Dr. H. H. Corbett in this wood and probably existed until the wood was destroyed (Doncaster Museum record).
5. The Blaxton area.
   (a) Recorded as being noted at Auckley.
   (b) Seen in 1967 at Blaxton Common. (Both Blaxton area records from Doncaster Museum records).
6. Potteric Carr
   In 1974, three Gatekeepers were noted in late-July and early-August (per Mr. I. Heppenstall).
7. Almholme.
   Noted in July and August 1974 and remembered by Mr. I. Heppenstall in that area about 1960.
8. Martin Beck Wood, near Tickhill.
   Recorded in 1962 (Doncaster Museum record).
9. Roche Abbey.



Stations of the Gatekeeper Butterfly in the Doncaster District.

Not seen apparently in the twentieth century but a record was omitted by Porritt since the species was recorded in the Y.N.U. circular number 125 (11th July 1896).

I suspect that in the Doncaster and Thorne areas and possibly elsewhere the butterfly has been overlooked and there seems every likelihood that other stations may be located. Certainly I have discovered previously unknown colonies merely by "breaking new ground". However, countering this is the climatic consideration outlined previously; whether the Gatekeeper will contract its range from its present stations within Yorkshire remains to be seen. Will it indeed disappear in the country as the High Brown Fritillary *Fabriciana adippe* and the Comma *Polygonium c-album* have already done? Or is there perhaps still some hope?

Acknowledgements

In compiling this paper several naturalists have been consulted and I would like to record my thanks to Dr. W. Smellie and Messrs. I. Heppenstall, E. Dransfield, A. Shaw, C. Wall and K. J. Willmott. I should also like to thank the Doncaster Museum authorities for allowing me to publish records from the Museum's card indexes.

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Butterflies, by **Geo. E. Hyde.** Pp. 64 Almark Publishing Co. Ltd. 1974. £1.25.

This book is very similar in style and layout to the two butterfly booklets by the same author published in the Jarrold Nature series and recently reviewed in these columns. Whether a further book covering the same ground can be justified is probably a matter of opinion. The present work, however, gives much fuller treatment. After an introduction and detailed comment on distribution, each of the British species is described under the sectional headings: "Special features", "Range and haunts" and "Life History".

A few errors, mostly of a minor character, are present. The usual foodplant of the Chalkhill Blue is *Hippocrepis comosa*, not *Anthyllis*. Recognition of the Black Hairstreak as a British species dates from 1828, not 1928. In line with present custom, *Hamearis lucina* is described as the "Duke of Burgundy": the reference therefore to a butterfly group of which this insect is not a member, seems superfluous and misleading.

Nearly all the colour portraits represent parts of the author's excellent work which have not hitherto come under our notice. On the whole the colour reproduction is very good but is marred in a few instances by lack of contrast, as witness the Ringlet and Black-veined White.

Essentially intended for the country lover, and all who appreciate the natural, lovely things of this earth, this book will make a strong appeal and may be highly recommended.

C.R.H.

THE GOOD OLD DAYS

G. A. SHAW

Browsing through old Y.N.U. circulars is a fascinating occupation and to a railway enthusiast it is mouth-watering to read of train services to such places as Pateley Bridge, Tanfield, Masham and stations on the Settle-Carlisle line.

In 1879 there was a meeting of the Union at Harrogate and the circular gives times of trains from Bradford to Harrogate (N.E.Rly.) and from Harrogate to Pateley Bridge. The main purpose of this meeting was to investigate the flora and fauna of the immediate neighbourhood of Harrogate, but as if that was not enough arrangements were made for members who had time to visit upper Nidderdale and permission was to hand for visits to be made to Brimham Rocks, Ravensgill, Guisecliffe, the lead mines at Greenhow and How Stean beck. Those wishing to see the lead mines "must write to Capt. David Williams, Pateley Bridge. Should he receive any such intimations he will conduct a party through the mines." A meat tea was laid on at the People's Hotel, Albert St., Harrogate, at a cost of 1s. 6d. The report on this meeting says that most of the excursionists went to Pateley Bridge and only a very few remained in the vicinity of Harrogate.

At the Doncaster meeting on 4th August, 1879, "the rendezvous will be in the Station Yard. Leaders of parties will be distinguished by wearing a piece of blue ribbon in the button hole of their coat. Mr. John Hawley will, if his health permit, conduct a party of entomologists to Edlington Woods."

For a meeting at Filey on 11th June, 1883, we are informed that "low water will be about two o'clock in the afternoon, and Dredging gear will be in readiness, provided by Mr. Geo. Massee, which can be used from boats." What must have been a unique meeting took place on Wednesday, 3rd September, 1884, at "The Spurn", for this must be the only occasion when the Union had tea at sea. Under the heading 'Routes', we are told that "The Excursion will be made by steamer from Grimsby Docks. Members may travel to Grimsby either via Doncaster or via Hull, reaching the Docks Station at 11.10 and 10.45 a.m. respectively. The Steamer 'Humber' will leave the Tidal Basin (near the Water Tower, the most conspicuous object in Grimsby) at 11.30 a.m. precisely, arriving at Spurn about 12 noon. The Steamer will leave Spurn at 4.0 p.m. giving ample time for members to take the 5.20 p.m. return trains. Tickets for members and associates and their friends — which will include Meat Tea, Steamboat fare, Landing and Dock dues — 4/- each, if applied for to Mr. Roebuck on or before the 31st August, after which the price will be 6/- each. Upon this occasion it is necessary that these conditions should be strictly enforced. Meat Tea will be served on the boat immediately on leaving Spurn. It is impossible to hold meetings, but as it is incumbent on the Officers of Sections to collect information on the day's work for publication in the *Naturalist* it would be well for the members of each Section to sit as near together as possible at tea."

The fifth meeting for 1885 "will be held at Blubberhouses by invitation of the Right Hon. Lord Walsingham. Conveyances will leave Harrogate station at 9 a.m. Return fare 2/6. Programme of Meetings.

3.0 Refreshments at Lord Walsingham's Shooting-box (*Note*: This building is still standing, and is the present Blubberhouses Hall, a substantial building set well back from the road to West End just after one has left the Skipton-Harrogate road).

4.0 Sectional Meetings.

4.30 General Meeting.

5.45 Conveyances will leave Blubberhouses, reaching Harrogate in time for the 7.30 trains to York and other places."

A detachable slip is appended to the form stating that "Lord Walsingham's Card of Invitation will be forwarded to every member or Associate who fills in and returns this form, so as to reach the Secretaries on or before Wednesday the 23rd September and conveyance accommodation — for which tickets will be issued — will only be provided if ordered and paid for in advance."

The 67th meeting, 20th July, 1887, was held at Thirkleby Park by invitation of the President, Sir Ralph Payne-Gallwey, Bart., M.B.O.U. Conveyances left Gormire for Thirkleby Park. 3.30 Dinner in the Riding School at Thirkleby Park; 4.30 Sectional Meetings; 5.0 General Meeting; 6.0 grounds, gardens and decoy open for inspection; 7.0 conveyances leave for Thirsk Junction for the 7.50 train (York) and 8.10 train (Leeds) and the 8.30 train for the north. (See *Nat.* 1971, 67 for further details of this meeting).

The meeting at Muker on 2-4 August 1890 sounds rather strenuous if not indeed hazardous. "Members all book to Askrigg. The party leaves Askrigg on foot at 1.30 under the leadership of Mr. J. G. Goodchild to cross the moor into Swaledale by way of Oxnop Pass, Muker, Thwaite and Angram to Keld. The leader will point out the chief geological features en route, and members will be conducted to their respective destinations. Distances from Askrigg: to Muker 5 miles, to Gunnerside 6 miles, to Thwaite 6 miles, and to Keld 8 miles. Members unable to reach Askrigg before 5.23 and 6.42 are requested to advise the Secretaries in order that arrangements may be made for guides to conduct them over the moor." Terms for full accommodation are quoted: "At Keld, the Cat Hole, 5/-; at Thwaite, Joiners' Arms, 5/6; at Muker, Farmer's Arms, 4/-." On the occasion of our meeting at Keld in 1937, which I attended, terms at the Cat Hole were still cheap at 7/6 per day. To my regret this homely little hostelry is now closed.

Postcript: Lord Walsingham died on 3rd December 1919 and an obituary appears in *Nat.* 1920, 32. It is here stated that Lord Walsingham was "in his entomological work ably assisted by his sister, The Hon. Beatrice De Grey (now the Hon. Mrs. Carpenter) and who, some years ago, presented her own collection of Lepidoptera with the cabinet to the Technical College Museum, Huddersfield." This statement solved for me a little mystery which until now I had been unable to fathom. When I took over as Y.N.U. Membership Secretary in 1956, The Hon. Mrs. Carpenter's name appeared in the members' list. No subscription was ever received from the London address given and no communication which I sent was ever answered. As her brother had died in 1919, it is highly unlikely that the Hon. Mrs. Carpenter was still living in 1956. It was only on reading Lord Walsingham's obituary recently that the identity of Mrs. Carpenter was revealed.

BOOK REVIEWS

The Wild Flowers of Guernsey, by **David McClintock**. Pp. 288 with 73 line drawings. Collins. £4.75.

The best county Floras are invariably those whose authors combine expertise in the field with industry in the library. However diligent and meticulous an author may be in the compilation of records, if he lacks that complementary flair and zest for field work his finished work is likely to be competent and informative but to lack the vital spark which brings it all to life. If he has the latter but skimps the former we are left with the disappointed feeling that his work is good as far as it goes but much alas remains untold. Such precepts applied to Mr. McClintock's book leave no doubt as to the standing of this Flora. It is admirably thorough in every respect and the author's enthusiasm for his subject continually shines out from its pages.

Since Marquand's Flora was issued in 1901 a number of species have become extinct. The drastic reduction of marshes and bogs in particular has led to the disappearance of some species, including Summer Lady's Tresses Orchid and Water Germander, whilst others have become increasingly rarer — a trend which is likely to continue. Against this must be set the new discoveries which include some exceptionally interesting ferns, sufficiently remarkable indeed to have qualified for representation in a recent set of postage stamps.

Following the opening chapter on the island and its flora there is an excellent account of the history of botanical investigations in Guernsey which incorporates much bibliographical research. The main text includes not only "wild flowers" but copious introductions, garden escapes and waifs and strays of all sorts, together with all erroneously recorded species. In all 1,340 species and hybrids are listed excluding numerous brambles and dandelions; a remarkable total having regard to the very large acreage covered by greenhouses. There is a wealth of interesting detail about the history of the more notable species and these are mostly illustrated by sketches. The presence or absence in other Channel Islands is indicated for each species and Jersey plants not known to occur in Guernsey are also mentioned.

For a botanist to go to Guernsey without this Flora in his pack would be as sensible as for a mountaineer to set off for the Alps without his boots.

W.A.S.

A Field Guide to the Nest, Eggs and Nestlings of British and European Birds, by **Colin Harrison**. Pp. 432 lavishly illustrated with paintings of young birds, colour photographs of eggs and line drawings of nests etc. Collins, 1975. £3.50.

With the proliferation of books on birds' nests and eggs in recent days, one must suppose there is a good market for them. I suspect that quite a percentage go to youngsters and must restate my reservations about books, however well-meaning, which deal with this subject. It seems to me also that the idea that "it should be possible to identify the bird involved from either the nest and its site, or the eggs, or the young one "is basically a wrong approach.

Having made these qualifications, one cannot too highly commend the present Field Guide. Dr. Harrison, who is responsible for the care of the national collection of birds' nests and eggs at the Natural History section of the British Museum at Tring, is obviously well-placed to undertake this particular project. He has made an excellent job of it and has certainly succeeded in "adding his own contribution" to the efforts of earlier workers. He has consulted the data on breeding in *The Handbook of British Birds* and in turn will himself be consulted when the *Handbook* is brought up-to-date.

This book follows the pattern of the recent one on *Birds of Britain and Europe* by Heinzel, Fitter and Parslow. It opens with a warning about the vulnerability of birds at nesting time. This is splendidly done. I would like to see it reproduced and widely circulated each spring.

The attractively illustrated introduction gives a concise account of the various nesting habits, types of eggs, incubation and hatching, and growth and care of young. There are three keys to identification, one to nests, one to eggs and one to nestlings and chicks. The main bulk of the book is a classified list of 588 species for each of which information is given on the nesting habitat, and under the headings nest, season, eggs, incubation, nestling and nestling period. For range it is necessary to consult the companion volume. In some instances, the heading is merely followed by the statement "no information". The classified list is prefaced by a request that information not already published on any of these aspects should be made available.

Bearing in mind the limitations imposed by the high degree of variability in eggs of many species, the 48 photographic plates depicting 700 typical eggs of some 560 species are outstandingly good.

Perhaps the most attractive feature of the book is the 145 chick paintings by Dr. Philip Burton. Again the limitations of a single illustration (usually at its most appealing stage, though the more reptilian nestlings are not omitted) of a chick which develops so rapidly during the first two or three weeks of its life must be appreciated by anyone using this book for reference. Many naturalists will have photographs of young birds which are unrecognisable as the same species as some of those depicted.

Nevertheless I am sure that this will become a standard reference book. It is unlikely to be surpassed in the foreseeable future and even at £3.50 must be considered a good buy.

R.F.D.

A Memoir of Thomas Bewick written by himself. Edited with an introduction by **Iain Bain.** Pp. 258 with 8 plates, Oxford University Press, 1975. £6.50.

Thomas Bewick was one of he greatest engravers of all time. The memoir gives us an insight into this charming and talented north countryman. The factual information about his career is not complete in the memoirs and there are long passages expounding his philosophy about life and religion. The editor fills in the gaps by a scholarly introduction, bibliography and a detailed chronology. There is an interesting account of the techniques of engraving used by Bewick.

For the first time the editor has published the full text of the memoirs. Previous editions had been cut by his daughters and others to avoid the exhibition of Bewick's rationalist and radical views. This edition gives the reader the opportunity to appreciate Bewick's common sense. Constantly one wishes that his viewpoint on many topics from Ireland to religion had been followed by his and our own generation. The integrity and goodness of the author shines through even the most prolix passages. The views expressed are the product of the earnest debates held by Bewick and his friends in Swarley's Club in Newcastle.

The place of Bewick as an engraver is established. His place as a natural historian is more difficult to assess. Turning to his *British Birds* and *Quadrupeds* one realises that they are now collected for the engravings and not read for the supporting text. Indeed there is considerable doubt about how much of the text was written by Bewick and how much by his partner Ralph Bielby. Much of the information consists of second hand quotations from other sources such as Buffon but now and then the clear-sighted, original observation of the countryman and angler Bewick shines through the dull text. Equipped with the sophisticated sources of information available today, we forget that Bewick's books were landmarks which helped to start the nineteenth century revival of interest in natural history.

This edition of the memoirs is beautifully produced and illustrated with Bewick's engravings. It is a joy to handle and to read and the editor has given those interested in learning more about the subject, very ample bibliographical information.

J.D.P.

The Chordates, by **R. McNeill Alexander.** Pp. viii + 480 with 215 figures, graphs and tables. Cambridge University Press, 1975. £10.00.

Any new book on the chordates has to overcome the problem presented by the enormous increase in the information now available, so the author has to aim at the double target of a satisfactory basis in his selection of material and the retention of that sense of balance so necessary in the book as a whole. The weighting here is primarily towards how an animal works, but this is supported by a broad zoological basis and illustrated by appropriate experiments chosen by a highly felicitous touch. The introduction covers a number of techniques and conceptions made use of later in the book, then a short chapter on the protochordates preceding a full treatment of the fish, with later chapters on the higher groups. A feature of the book is the very skilful manner in which structures and processes are introduced at points in the narrative rather earlier than expected but which later are seen to be entirely suitable; so in the chapter on fish without jaws there is not only an interesting account of the breathing, feeding and so on of lampreys and hagfishes but also short dissertations on the acoustico-lateralis system and its functions, eyes and their water-to-air adaptations, water balance in the tissues leading to a general account of kidney functioning — returned to later at the mammalian level — and different forms of calcification. An unusual feature is the free use of physical and engineering methods, with the concomitant mathematics, applied to certain questions — as swim bladder changes, types of fish swimming and bird flight — where it is essential that such methods are used if more than a superficial understanding of the phenomena are sought. A final comment must be made on the excellence of the presentation, which allows an astonishing amount of information to be transmitted without tedium and hence the book to be one which can genuinely be read with pleasure.

T.K.

Looking at Animals: A Zoologist in Africa by **Hugh B. Cott.** Pp. 221 with 62 plates and 91 drawings. Collins. £4.95

This is a splendid book for the relaxation of informed naturalists. If you cannot have the actual experience of an African safari this is certainly the next best thing; it evokes the animals in their habitats in a variety of ways, by the written word, through photographs and though the most delightful drawings, all produced by the author and all illustrating different aspects, so amply justifying the title. If you have been fortunate enough to have visited East Africa the evocation is even greater, but you will wonder why you missed this or that observation and you will be pleased to know the answers to questions which must surely have presented themselves. This is of course because, as the subtitle shows, Dr. Cott is a zoologist and the book is a product of his long involvement with African animals both as a research worker and latterly as a guest lecturer on safari tours.

The main section of the book reads easily, like a conversation piece and touches on a great many topics relevant to African wildlife. The first chapter, slightly irritatingly, appears to have been written last and reads somewhat like a conclusion, but this feeling is rapidly dispelled by the interest of succeeding chapters. Refreshingly, the book is not a catalogue of what to see where, or how to tell one antelope from another but an attempt to put the animals into perspective. There is a discussion of the food chains of which the animals are a part, indicating how crocodiles, for example, may be at different points in this chain at different stages of their life history. There is an attempt to analyse why there are so many members of the Artiodactyla in this area, particularly the Bovidae; which ecological niches they fill, how they interact with each other and may replace each other at different seasons when the grass is too long for this species or too short for that one. An interesting ecological environment is the aquatic one to which both the mammalian hippopotamus and the reptilian crocodile are adapted, so Dr. Cott points out the similarities in these very different animals imposed by the environment. In fact having made a special study of crocodiles this particular knowledge forms a most valuable section of the book on their life habits, courtship and maternal care, and the intriguing information that adult crocodiles swallow stones for ballast. Dr. Cott's other specialist interest in colouration and camouflage is also reflected in an interesting chapter. In fact the reader may feel that there is not enough of this rather short book, for just as a topic is getting into its stride it is replaced by another one. However there is a good basic reference list and the frustrated reader could delve further.

The book is well produced on good quality paper which does justice to the drawings and obviously much care has been given to its production. It is excellent value and will give many readers much pleasure.

I.W.

Wild Flowers by **Homer D. House.** Revised edition. Pp. 362 with 264 colour plates and 37 monochrome photographs. Collier MacMillan, 1975. £5.

This reissue of a work which first appeared in 1934 covers the wild flowers of eastern North America from Labrador southwards and from the seaboard inwards to the Mississippi States. About 400 species are clearly described and illustrated and an approximately equal number mentioned more briefly. The selection seems somewhat arbitrary since only a single Umbellifer is included and keys for the identification of species are supplied for nine genera only. There are no keys to families or genera and since the essential distinguishing features of the genera in each family are not supplied, the user is committed to reading through all descriptions or relying largely on the pictures for his identifications. The quality of these however is such that he should have little difficulty in matching his specimens with them. Numerous introductions from Europe now widespread in America are included, sometimes under colloquial names which would render them unrecognisable by English botanists as, for example, Cuckoo-flower for *Lychnis flos-cuculi* and Ramstead for Yellow Toadflax. This is a handsomely produced and illustrated book but it will have a very limited value to anyone not resident in the area covered.

W.A.S.

Portrait of Nature: The World as seen by Modern Science, by **Sir Alan Cottrell**. Pp. 236 with 50 text figures. Collins, 1975. £2.50.

In this elegant and very readable book the author presents science, not in terms of applications which have led some to distrust it, but as a magnificent adventure whereby the mind of man has striven for an understanding of the universe of which he is so insignificant a part. The 'Nature' is therefore not only the 'Nature' of the naturalist but rather of the natural philosopher. The presentation is aimed at the non-scientist and it is understandable that, in covering such a vast range of enquiry, it calls upon the reader to accept statements *ex cathedra*; though some issues, such as the twin paradox in relativity, are spelled out with remarkable clarity.

The first eight chapters reveal our progressive understanding of the physical laws that operate in our universe; the laws of space and time and matter; the laws of gravitation and relativity; the structure of the atom and its nucleus and the laws which quantify their motions; the duality of particles which can masquerade as waves; the Uncertainty Principle and the significance of the quantum of action. Chapter 8 opens the curtains on the stage of the Earth which the remaining five chapters then populate by dealing with evolution, including molecular evolution, heredity and genetics and the variety of species. The last two chapters take the reader into the range of the mind. With such a broad spectrum to cover the book could have been 'bitty' but the author has skilfully instilled a satisfying wholeness.

The layman will not read this book with ease, but should not by that be put off from a text which will give him an understanding of the universe and of himself which no modern man should be without. Scientists should not be deterred either because the book is aimed at laymen; biologists have much to gain by reading at least the physics, and physicists the biology. Each will find that the realm of the other is as exhilarating and exciting as his own when seen through the eyes and mind of an author who has achieved a synthesis which, if not unique, is rare.

R.D.P.

The Physiology of Giant Algal Cells by **A. B. Hope** and **N. A. Walker**. Pp. xiii + 201. Cambridge University Press, 1975. £7.00.

The giant cells of algae such as *Chara*, *Nitella*, *Valonia*, *Halicystis*, *Hydrodictyon* and *Griffithsia* have provided physiologists with research material for nearly two centuries, leading to an ever-increasing flow of observations and experimental data on protoplasmic streaming, water relations, ionic relations, active transport, transport of CO_2 and bicarbonate ions, action potentials and electrical properties of cell membranes. The book under review is deliberately restricted to a consideration of biophysical phenomena in such cells; even related biochemical, genetical, cytological and ultrastructural investigations are not discussed in any detail. It is thus a specialised research volume written by experts for the benefit of fellow biomathematicians and biophysicists who also work on giant algal cells or similar material, or who have a direct teaching or research interest in the physical problems involved. By its very nature this book is unlikely therefore to be of interest to the majority of general biology teachers and naturalists.

G.F.L.

A Key to British Dixidae by **R. H. L. Disney**. Pp. 78 with 2 plates, 23 figures and 14 maps. Publication No. 31. Freshwater Biological Association.

Dr. Disney's treatment of his subject is thorough, dealing with the basic taxonomic problems of the meniscus midges, and with ecological and distributional data. There are keys to larvae, pupae and adults, and maps showing the distribution of all of the known British species. The maps do not show the detailed distributional patterns of these fascinating insects but as the author states they and the distributional notes are "more an indication of our ignorance than the detailed summary that would be desirable". It is to be hoped that this excellent little monograph will provide the necessary boost for much more work to be carried out.

P.S.

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PUBLISHED BY

THE YORKSHIRE NATURALISTS' UNION

THE NATURALISTS' YORKSHIRE

Compiled by members of The Yorkshire Naturalists' Union and edited by W. A. Sledge. Pp. 96 with 15 photographic illustrations. Dalesman Publishing Co. Ltd. Obtainable from The Editor of *The Naturalist*. Price 60p plus 13½p postage.

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from The Editor of *The Naturalist*. Price 50p plus 11p postage.

Also "The Macro-lepidoptera of Spurn Head, E. Yorkshire" by S. L. Sutton and B. R. Spence (ex *The Naturalist*, 1974); price 25p plus 6½p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published three times a year: February, May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

CHISLETT MEMORIAL LECTURE, 1976

Preliminary Notice. Members are asked to make a note in their diaries, and society programme secretaries to include in their local society syllabuses:

The 12th (and final) Chislett Memorial Lecture will be held at 6.30 on Saturday 13th March, 1976 in Harrogate.

Full details will be circulated later but the speaker booked for this occasion is Edward E. Jackson, formerly of Masham and now Education Officer to the Wildfowl Trust. His lecture "North of the Desolate Sea" will deal with an expedition to Spitzbergen.

A CHECK LIST OF THE BIRDS OF ECCUP RESERVOIR

S. P. SINGLETON

Eccup Reservoir (Grid Reference 298417) lies five miles north of the centre of Leeds, within the City boundary and to the west of the main Leeds-Harrogate road (A.61). Initially built in the 1830's, with a capacity of 250 million gallons, and covering an area of almost 56 acres, it was enlarged to its present size in 1897 and now covers almost 200 acres with a maximum capacity of 1,410 million gallons. The position of the Reservoir on the watershed of a small tributary valley to the river Wharfe is ideally sited for attracting local and national passage and migrating birds, a point which is made clear in more detail in the check list.

There are six main types of habitat which fall within the area with which this paper is concerned. The fields to the south-west, west and north (between the embankment and Eccup Moor road) are either arable land and contain many different crops, or are used for grazing sheep and cattle.

On the southern side of the Reservoir lies the "Main Wood" which is almost wholly coniferous, composed of Scots Pine and Spruce, though there are, particularly towards the western end, some deciduous trees such as sycamore, beech, silver birch and elm. Undergrowth in the wood is restricted in many parts but consists of grasses, brambles, ferns, heather and small elderberry bushes.

The area of woodland to the west and along the whole of the north bank is composed of an outer layer of deciduous trees, principally sycamore and oak and an inner layer of coniferous trees. At the eastern end of the Reservoir near the dam there are both High Wood and. Wigton Knowle which are stands of old timber, chiefly beech, oak and elm trees.

Adjoining Wigton Knowle there is a golf course which has areas of gorse bushes, rough ground and scattered trees besides the open areas of the fairways and greens.

The sixth and final type of habitat is the Reservoir itself. With a maximum depth of 62 feet 3 inches it is treated regularly in order to keep the water clean by preventing too much growth of algae and weeds.

Surrounding the water is the embankment where many birds roost, areas of mud and shingle which afford limited feeding grounds for some ducks and passage migrants such as waders. In "Willow Corner" there is a small stand of reed mace which has grown in the last eight years and now provides a breeding area for some species of wildfowl when disturbance is not too great.

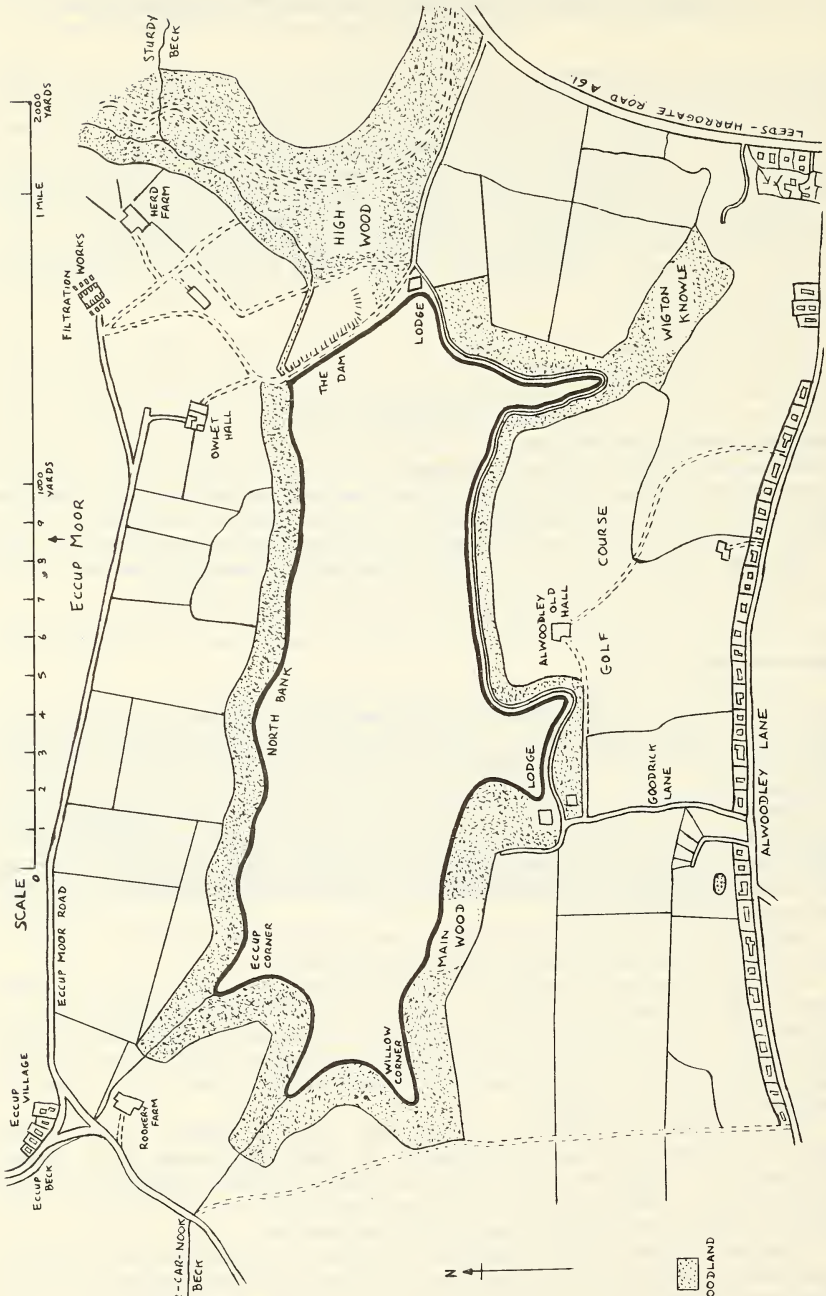
Entrance to the Reservoir, which is restricted (all enquiries must be made to Leeds Corporation Waterworks Department) is made via the lodge at the end of Goodrick Lane. All exits must also be made at the same point. For members of the public there is a footpath which runs between the two lodges (positioned at the end of Goodrick Lane and on the dam) and up on to Eccup Moor road.

The intensity of watching in the area has a great bearing on the statements concerning the status of the following species and this must be borne in mind.

I can find no documented records of birds at the Reservoir before the close of the 1920's when A. Gilpin began spasmodically to watch the area. The trend of periodic visits was continued up to and throughout the war years. After the formation of the Leeds and District Bird Watchers' Club in 1948 and the granting of permission to visit all the area owned by Leeds Corporation Waterworks Department, instead of just the public areas, some more detailed information was available.

It was not however until the late 1950's and early 1960's that birdwatching on a regular basis was undertaken, primarily by Messrs G. R. Naylor, M. Densley, N. F. Robson, J. Roberts, E. C. Sterne etc. The results of this period of intensive watching (210 days in 1959, 293 days in 1960 and 258 days in 1961) form the basis from which this paper is made; the status of many species having changed little since these times.

Throughout the early sixties comprehensive watches were undertaken until 1965 when there was a noticeable drop in "attendances", the trend being continued until 1971 since which time interest has been renewed somewhat and the area has been watched for up to 150 days of each year.


STURDY BECK
LEEDS - HARROGATE ROAD A61
HERD FARM
FILTRATION WORKS
HIGH WOOD
THE DAM
LODGE
WIGTON KNOWLE
OWLET HALL
ECCUP MOOR
NORTH BANK
ALWOODLEY OLD HALL
GOLF COURSE
LODGE
GOODRICK LANE
ALWOODLEY LANE
ECCUP MOOR ROAD
ECCUP CORNER
MAIN WOOD
WILLOW CORNER
ECCUP VILLAGE
ECCUP BECK
ROOKERY FARM
ELLER-CAR-NOOK BECK
SCALE
0 1 2 3 4 5 6 7 8 9
1 MILE
2000 YARDS
1000 YARDS
N
WOODLAND

CHECK LIST AND BRIEF NOTES ON STATUS

Black-throated Diver *(Gavia arctica)*

A very rare winter visitor. Two records exist of single birds from November 3rd to December 1st 1935, and January 4th to 6th 1970.

Great Northern Diver *(Gavia immer)*

An extremely rare winter visitor. Only one record of a bird present on both November 6th and 20th 1960.

Red-throated Diver *(Gavia stellata)*

A rare winter visitor of which there are seven records: One bird present from May 6th to 31st 1947; one from January 21st to March 9th 1950; one on February 14th and 15th 1953; one on January 31st 1954; one on January 25th 1958; two on March 14th 1961 and one on October 24th 1970.

Great Crested Grebe *(Podiceps cristatus)*

Formerly irregularly wintered; since 1963 has done so regularly in ones and twos, it is, however chiefly a spring and autumn passage migrant, with varying numbers remaining to summer. The maximum numbers recorded are 16 birds during the spring and 23 birds during the autumn migration, with up to 12 birds recorded summering. A pair attempted to breed in 1972, unsuccessfully. Two young were hatched in 1973 but were lost, and again unsuccessfully attempted in 1974 and 1975.

Red-necked Grebe *(Podiceps grisegena)*

A rare winter visitor, with six records of single birds present on January 31st and November 28th 1954, February 23rd 1956, January 26th 1957, September 28th 1963 and November 20th 1966.

Slavonian Grebe *(Podiceps auritus)*

A rare winter visitor of which there are seven reports: one bird present on October 20th and 22nd 1950; one on October 10th and 11th 1953; one from March 7th to 14th 1954; one on November 25th 1954; one on February 12th 1955; two on March 2nd 1958 and one possibly two birds present on December 29th and 30th 1972.

Black-necked Grebe *(Podiceps nigricollis)*

A rare winter visitor, occasionally occurring on passage. All seven records are of single birds, on January 12th and 19th and August 3rd 1947, February 12th and October 22nd 1950, August 6th and October 22nd 1962, February 13th 1963 and April 27th 1967.

Little Grebe *(Podiceps ruficollis)*

A local visitor which is only infrequently recorded, usually in winter, but has occurred in April, May and July. First recorded in 1953 then regularly until 1965 after which there was no record until 1970. The species has since returned to its former status of up to ten records for the year involving usually single birds though up to three (as on April 8th 1974) have been noted.

Leach's Petrel *(Oceanodroma leucorrhoa)*

A very rare storm driven vagrant of which there is a record of one bird seen on October 12th and 19th 1952. The bird was picked up dead on October 30th and a skin later made. It is now in the possession of W. Bennett Esq.

Cormorant *(Phalacrocorax carbo)*

An occasional visitor usually noted in spring and late autumn and winter months. There are seventeen records from 1953, 1955, 1960, 1961, 1963, 1965, 1966, 1972 and 1974. Most reports are of single birds, but up to four birds (as on May 14th 1960) have been noted.

Heron *(Ardea cinerea)*

A species which was regularly noted at the Reservoir in the years when the nearby Harewood Park Heronry was in existence, with up to 15 birds recorded in the autumn. Since 1963, when the Heronry was deserted, only small numbers (increasing in more recent years with up to 13 birds reported) have been noted, mainly in autumn.

Mallard *(Anas platyrhynchos)*

A resident species of which up to five pairs breed. It is however notably a wintering bird, arriving in September and remaining until late March. The figures given below in brackets represent the numbers most likely to be present, the others being the maximum recorded.

January	(750+)	1,850 in 1966
February	(c600)	c1,000 in 1966
March	(300+)	c650 in 1966
April	(100+)	620 in 1953
May	usually less than	
June	50 birds but	250 in 1961
July	sudden influxes	
August	randomly occur	600 in 1975
September	(400+)	c2,000 in 1972
October	(500+)	c1,250 in 1966
November	(750+)	c1,800 in 1968
December	(c900)	c1,500 in 1953 and 1961

Teal *(Anas crecca crecca)*

Principally a wintering species, with the highest numbers occurring in the early months of the year (maximum of 56 in 1961), falling off in April. Usually absent during the summer, though occasionally birds do stay. July and early August sees a return, and the numbers again build up to a peak in November and December, with a maximum of c120 in 1966.

Green-winged Teal *(Anas crecca carolinesis)*

A very rare vagrant. There is one record of a male bird on February 19th 1960.

Garganey *(Anas querquedula)*

A very rare vagrant. Recorded singly with Teal on passage on August 15th and September 20th 1959 only.

Gadwall *(Anas strepera)*

A scarce visitor, usually recorded in spring, autumn and occasionally in winter, but not on a regular basis. Reports of birds in 1939, 1955, 1956, 1958, 1960, 1961, 1962, 1963, 1965, 1966 and 1967, with none since. Most sightings are of single birds, four on October 8th 1961 and five on October 21st 1962 being the highest numbers noted, whilst two on May 27th 1962 were very unusual.

Wigeon *(Anas penelope)*

A wintering species, remaining in the area until late April and early May. Returning by August and September, with numbers increasing towards the year end. Typical numbers for the early half of the year are c30 birds (maximum of c450 in 1954), and for the year end c20 birds (maximum of 250 in 1950).

Pintail *(Anas acuta)*

At one time a regular, but now only spasmodic visitor to the area during the winter months and on spring passage, involving usually no more than five birds. The maximum seen were 27 birds on February 16th 1950. Odd records, such as a drake on June 5th 1960, are very unusual.

Shoveler *(Anas clypeata)*

The species used to winter and was a passage migrant at the Reservoir in fairly high numbers in past years, with c20 birds regularly, and occasionally up to 40 in autumn. (116 on November 15th 1953 was an exceptionally high number.) Lesser numbers are present in the spring, usually less than 10 birds. In more recent years however, it has become purely a spring and autumn passage bird, with the larger numbers (up to 20) occurring in autumn. Although recorded in all the months of the year, reports in the period May to early August are unusual.

Red-crested Pochard *(Netta rufina)*

A very rare vagrant of which there is one record of a single bird, considered to be a female, which was present on June 29th 1962. "There was no evidence to suggest that this bird was an escape."

Scaup *(Aythya marila)*

An occasional winter vagrant, usually reported in singles or pairs, with 6 birds on November 10th 1946 and mid October 1958 as maxima. The species has, since the early sixties, been less frequent, and absent completely since 1966.

Tufted Duck *(Aythya fuligula)*

A wintering species, and spring, but principally autumn passage bird. After the autumnal passage peak in late September the numbers decrease throughout October and November, usually rising again in December, remaining into January and February. Occasionally up to 10 birds summer. A pair bred in 1973. During the fifties the species was scarcely reported, with only small numbers involved. The late fifties and sixties saw a rise in numbers with up to 64 in early winter, and 106 birds as an autumnal maximum. The trend has continued into the early seventies, where peaks of 86 and 150 birds have been noted.

Pochard *(Aythya ferina)*

A wintering and passage bird, occasionally summering, but always in smaller numbers than Tufted Duck. In general, the numbers present in the early winter and spring are lower than autumn and late winter. In 1953 c20 birds in March were regarded as an outstanding record, and figures similar to this were scarce until the early sixties when, in 1963, the exceptional number of c100 birds were present in November and December. Recently the species has been recorded more frequently, but in smaller numbees with an early winter and spring maximum of 20+ birds, and 55 as an autumn and late winter maximum.

Ferruginous Duck *(Aythya nyroca)*

A very rare vagrant of which single birds have been recorded on February 20th, March 27th, May 1st and 2nd 1960, and January 24th 1974. Two birds were present on September 3rd 1975 but there was no evidence to suggest whether these were escapes or not.

Goldeneye *(Bucephala clangula)*

A winter visitor, which arrives in late September and October and remains until late April and early May, with peak passage numbers in mid-November and early April. Throughout the forties and fifties numbers totalled between 10 and 20; during the early sixties they increased to 20 to 30, with peaks of 44 on November 5th 1961 and 21 on April 125h 1963. From 1965 until 1971 figures of double numbers were scarce, but since then they have increased again, and peaked 45 on November 14th 1973 and 32 on April 3rd 1975. Records of summering birds are scarce. A drake was present all summer in 1961, and three ducks were noted from July 1st to 11th 1973.

Long-tailed Duck *(Clangula hyemalis)*

A rare winter visitor of which there are five records:
One bird present on October 22nd 1950.
One male present on November 17th 1957.
One male present from July 2nd to 9th 1961.
One female present on October 18th 1961.
Two males present on January 7th 1968.

Velvet Scoter *(Melanitta fusca)*

A very rare passage bird of which there are two records. A single bird on September 20th 1962, and two on October 12th 1968.

Common Scoter *(Melanitta nigra)*

A frequent spring and autumn passage migrant, occasionally at other times of the year. Occurring in fluctuating numbers. Most reports (which cover every month of the year) usually involve numbers of less than five birds, notable exceptions being 20 birds on July 13th 1947, 50 on July 11th 1948, c60 on August 9th 1958, 48 on August 13th 1961, 26 on July 8th 1962 and 17 on July 8th 1974.

Eider *(Somateria mollissima)*

An exceptionally rare winter visitor. There is one record of a bird, believed to be a second winter male, on January 12th 1964.

Red-breasted Merganser *(Mergus serrator)*

An occasional passage and winter visitor, recorded at regular intervals from the late forties onwards. Nearly always involve single birds, though up to 7 (as on December 18th 1955) have been reported.

Goosander *(Mergus merganser)*

A regular winter visitor, usually arriving in late October and early November, and slowly building up to a peak in late December. This trend is usually carried on in January, peaks in mid February, drops slightly, and rises again in late March. Birds often remain into late April and early May. The species, like the Goldeneye, has declined over the last fifteen to twenty years and is only just making a "come back". Figures typical of the period prior to the decline are that of 1953 when there was a spring maximum of 86 birds on March 22nd, with c40 birds at the years' end, whilst in 1965, in the decline period, there was a spring maximum of 15 birds on February 28th, and only 7 birds on December 28th. During 1974 there were 42 on March 27th, and 22 were present on December 1st, showing something of a return to former numbers.

Smew *(Mergus albellus)*

A scarce winter vagrant, which, like the former species and the Goldeneye, declined during the late fifties, and has not been recorded since 1961. Most reports which covered the period 1949 to 1961 were of single females, the maximum noted being 5 birds (including a male) on February 23rd 1954, and 6 birds on February 24th 1952 and February 12th 1961.

Shelduck *(Tadorna tadorna)*

A regular passage migrant, most often noted in spring, but has been reported in every month except June, usually in numbers of less than five birds. Notable exceptions were 10 in October, 1956, 19 on December 10th 1959, and 17 on September 5th 1960.

Ruddy Shelduck *(Tadorna ferruginea)*

One bird, presumably an escape, flew west on August 21st 1967. It is the only record.

Grey Lag Goose *(Anser anser)*
An occasional winter visitor most often recorded flying over in a westerly direction, and in numbers of up to 150 birds. All records for the water refer to numbers of less than five birds, usually singles, and nearly always present with Canada Geese.

White-fronted Goose *(Anser albifrons)*
A very rare winter visitor, of which there are four records. 18 birds on March 28th 1960, 55 55 on September 27th 1960, one on March 25th 1963 and one present from March 10th to April 5th 1964.

Pink-footed Goose *(Anser brachyrhynchus)*
A fairly regular winter visitor most often recorded flying over the area in a westerly direction in numbers up to 250 birds. All reports for the Reservoir refer to less than five birds, usually singles, and, like the Grey Lag Goose nearly always in the company of Canada Geese.

Barnacle Goose *(Branta leucopsis)*
An extremely rare winter visitor, there being only one record of a single bird which was present with Canada Geese on January 29th and 30th 1966.

Canada Goose *(Branta canadensis)*
Recorded regularly in all seasons on the Reservoir and quite frequently seen flying over the area. Many of the reports of flocks (which can number anything up to 450 birds) are of the flock which commutes regularly between the Washburn Valley, Harewood Park and the Reservoir, depending upon which area has been disturbed. Since 1966 at least one pair has regularly bred on nearby Eccup Moor.

Mute Swan *(Cygnus olor)*
A very occasional visitor, usually in the winter and spring months and involving only small parties of less than five birds. The species of Swan which is least likely to be seen on the Reservoir.

Whooper Swan *(Cygnus cygnus)*
A scarce winter visitor, fairly regularly recorded up to 1968 but not in any large numbers, and rarely since. Most reports refer to numbers of less than ten birds, but herds of 32 were present on January 5th 1947, 46 on December 29th 1948 and 20-30 were noted on December 7th and 8th 1959.

Bewick's Swan *(Cygnus bewickii)*
Another scarce winter visitor, not recorded as commonly as the Whooper Swan, and usually in lesser numbers, though parties of 21 birds were reported on November 30th 1957 and 42 were present on March 22nd 1963 (an exceptionally high number for the Leeds area).

Buzzard *(Buteo buteo)*
A very scarce visitor, only recorded on three occasions. Single birds were seen on August 14th and September 9th 1961, and August 30th 1971. No doubt some of the birds which are noted at nearby Harewood Park pass over the area.

Sparrowhawk *(Accipiter nisus)*
The second most common raptor in the area which formerly bred until 1958, but declined drastically during the early and mid sixties (in 1964 there were two records of single birds on February 15th and November 22nd only). The species has since increased and now regularly winters in the area in numbers of up to three birds. In 1974 it attempted to breed. Unfortunately, the tree in which the pair nested was felled during a "thinning out" operation in the Main Wood. A pair was successful in 1975 and reared two young.

Marsh Harrier *(Circus aeruginosus)*
A rare vagrant of which there are two records of a single bird on September 30th 1959, and two birds which were present on July 18th 1961.

Montagu's Harrier *(Circus pygargus)*
A rare vagrant, there being only one record of a single bird on July 16th 1960.

Osprey *(Pandion haliaetus)*
Like all large raptors a rare vagrant, of which there are three reports, all of single birds on passage in early May 1947, May 22nd 1973 and September 8th 1974.

Peregrine *(Falco peregrinus)*
A rare vagrant which has only been recorded in 1960, as follows: one bird present from March 30th to April 3rd and April 16th to the 18th.

Merlin *(Falco columbarius)*
A scarce visitor to the area which was recorded almost annually between 1958 and 1966, but not before and only on August 24th 1975 since. During 1960 there were five reports covering February, April, October and November; in 1961 there were again five reports covering January, March, August and October. All other records are of single birds.

Kestrel *(Falco tinnunculus)*
By far the commonest raptor in the area, recorded at all seasons. Occasionally breeds and there is some evidence that the species may be a spring and autumn passage bird through the area in some years.

Red Grouse *(Lagopus lagopus)*
An extremely rare vagrant of which there is only one record of a single bird present on February 17th 1963 (during the notably hard winter).

Red-legged Partridge *(Alectoris rufa)*
Resident in the area but in slowly decreasing numbers; one or two pairs breed in the nearby Eccup Moor area.

Partridge *(Perdix perdix)*
Resident, in former years with up to five, but now only two pairs breeding on the fields surrounding the Reservoir. In the past, numbers in the area rose during the winter months to around 50 birds, but since the decline of the species in the sixties figures have rarely reached 20 birds.

Quail *(Coturnix coturnix)*
A very scarce summer visitor which has occurred singly on five occasions; on July 1st 1964, June 28th 1969, June 20th to July 19th 1970, June 10th 1971 and in July 1973.

Pheasant *(Phasianus colchicus)*
Resident in the area, with one or two pairs breeding. Numbers usually rise in the winter months when up to 15 birds are recorded.

Water Rail *(Rallus aquaticus)*
A rare winter visitor which has been recorded as follows: in April 1959, one found dead on October 21st 1961, one bird present from November 27th to December 31st 1962 and into mid January 1963. A single bird was also noted on April 2nd 1963.

Moorhen *(Gallinula chloropus)*
Resident in the area, with one, sometimes two pairs breeding in most years.

Coot *(Fulica atra)*

Formerly rarely reported, when noted always in small numbers of less than 15 birds (43 on December 29th to 31st 1964 being the exception). Since the early seventies a wintering flock has become established totalling up to 70+ birds, as in December 1973 and January 1974. A pair attempted to breed in 1973, 1974 and 1975.

Oystercatcher *(Haematopus ostralegus)*

An occasional spring and autumn passage migrant which is recorded in most years, usually singly or in twos. The largest party noted were 12 birds which flew west on August 24th 1958.

Lapwing *(Vanellus vanellus)*

Resident, breeding in numbers of up to fifteen pairs on adjacent agricultural land. A wintering flock builds up in late July and early August, to peak in November and December around 500+ birds, though up to 2,700 have been noted. This flock moves around the area locally, and smaller parties of birds are frequently observed flighting during hard weather away from the main group.

Ring Plover *(Charadrius hiaticula)*

A very scarce spring passage migrant, but regularly reported in autumn, usually singly, or in pairs, with a maximum of 6 birds on September 4th 1954.

Little Ringed Plover *(Charadrius dubius)*

A rare vagrant with, until 1975, only two records of single birds seen on July 17th 1961 and on May 18th 1964. In 1975 two birds were reported on July 11th, three on the 6th, one on the 7th and two on both the 10th and 13th of August.

Grey Plover *(Pluvialis squatarola)*

Another rare vagrant of which there are five records. These are, one bird on August 4th 1953, four on December 5th 1959, one on September 28th and four on December 8th 1960, and one bird on October 4th 1964.

Golden Plover *(Pluvialis apricaria)*

An occasional visitor flying over the Reservoir. Regularly seen in the fields surrounding the Reservoir, and on Eccup Moor in numbers up to 500+ birds in both spring and autumn. The early winter flock increases in March and April with the arrival of passage birds, resulting in numbers of up to 1,000 birds (as on April 12th 1953) having been reported. The first birds of Autumn usually arrive in late July and early August, and gradually build up to peak in late October, falling in November and December.

Turnstone *(Arenaria interpres)*

A rare vagrant of which five records exist; one bird on January 11th 1947, three on August 30th 1953, two on July 22nd 1959, two on September 3rd 1962 and one on August 29th 1966.

Snipe *(Gallinago gallinago)*

Recorded occasionally during the winter months in ones and twos, increasing during spring, with up to five birds. Drumming is reported in many years but no breeding has yet been proved. Autumn passage is usually more marked than in spring with up to ten birds noted, numbers falling, to odd birds in November and December.

Jack Snipe *(Lymnocryptes minima)*

A rare vagrant for which there are six records, all of single birds which were seen on March 1st 1959, December 10th, 26th, 27th and 29th 1961 (probably all the same bird),

October 23rd 1965, March 28th and September 18th 1967, and December 25th 1973.
NOTE: The area from which the majority of the Snipe (and all the Jack Snipe) records come from was drained and ploughed over in 1974. This area lies to the S.W. of the Reservoir, and was a strip of wetland formed by a spring running through fields, eventually entering the overflow channel which runs around the Reservoir.

Woodcock *(Scolopax rusticola)*
An occasional winter visitor which in some years remains into the spring. "Roding" was recorded during the mid sixties but no breeding was proved. Most records refer to one bird though two birds have occurred together.

Curlew *(Numenius arquata)*
Single birds occasionally winter in the area but, chiefly the species is a spring and autumn passage migrant, with up to c40 birds recorded in spring and c25 birds in autumn as maxima. One or two pairs regularly breed in the area of Eccup/Eccup Moor.

Whimbrel *(Numenius phaeopus)*
Recorded on twentyeight occasions, principally as an autumn passage migrant (only one report being in spring), usually singly or in numbers of less than five birds. The largest parties were 16 on August 20th 1962 and 11 on July 19th 1964.

Bar-tailed Godwit *(Limosa lapponica)*
An occasional vagrant occurring both in spring and autumn though more commonly in the latter. There are seven records, one bird on August 8th 1953, two on August 8th 1958 and single birds on March 16th 1960, March 29th 1962, September 18th 1966 and July 25th and August 16th 1974.

Green Sandpiper *(Tringa ochropus)*
A fairly regular species on autumn, and to a lesser extent, spring passage. Usually reported singly. Two birds wintered in the area in 1948, and singles did in 1949 and 1967.

Common Sandpiper *(Tringa hypoleucos)*
A regular spring and autumn passage migrant. Normally one or two pairs remain to breed in the area. Arrives usually in mid April (the earliest being 4 birds on March 20th 1962) with up to 10 recorded in May as a spring maximum. Autumn passage is more prolonged (maximum of 21 on July 12th 1974) with odd birds remaining until late September, the latest being on October 13th 1973.

Redshank *(Tringa totanus)*
A regular spring and autumn passage migrant with numbers of up to five being frequently recorded (maximum of 12 on October 8th 1961). Occasionally a pair in summer have been presumed to breed on nearby Eccup Moor on a number of occasions.

Spotted Redshank *(Tringa erythropus)*
A rare vagrant occurring only in autumn. Of the six records all but one are of single birds. The first report was on September 4th 1965 followed by others on August 6th 1966, September 20th 1970, August 5th and 6th (five birds) and September 4th 1975.

Greenshank *(Tringa nebularia)*
An occasional spring passage migrant, far more widely reported in autumn. Singles are recorded regularly from late June to late September, occasionally October (and in 1959 November 2nd), whilst a bird on November 25th 1961 is one of the latest records in the Leeds area. The maximum number reported is 5 birds on August 25th 1961.

Knot *(Calidris canuta)*

A very rare visitor on passage, recorded as follows: One bird on March 1st 1959, a flock of 90+ on November 2nd 1960, two parties totalling 40+ birds on July 25th 1961, one bird on March 20th and 25th, two on August 6th and one on August 18th and 24th 1963, nine on September 4th 1973 and 12 on August 15th 1974.

Little Stint *(Calidris minuta)*

A very rare vagrant, only three records of which exist. These were one bird on July 24th 1955, two on August 22nd and one on September 20th 1961.

Dunlin *(Calidris alpina)*

An occasional spring passage migrant, more regularly seen in autumn. Spring passage parties generally number up to 4 birds (c55 birds on April 4th 1971 being the exception), whilst autumn records are more plentiful (and of larger parties on the whole), 14 birds on July 22nd 1974 being the maximum but numbers up to 10 birds are frequently seen. Winter sightings are scarce, only reported in January of 1954 (5 birds), December of 1963 (1 bird), December 1964 (6 birds) and January 1st 1971 (1 bird).

Curlew Sandpiper *(Calidris ferruginea)*

A very rare vagrant of which there are two records — a single bird on November 2nd 1959 and four on August 23rd 1961.

Sanderling *(Calidris alba)*

A very rare vagrant, with six records. One bird on July 23rd 1950, one on August 1st 1961, one on July 22nd and two on July 25th 1974 and singles on May 11th and August 1st 1975.

Ruff *(Philomachus pugnax)*

An occasional autumn passage migrant more often noted on the surrounding fields and Eccup Moor than around the Reservoir. Records include one bird on September 7th 1946, 17 birds on September 17th, 6 on the 18th, and one bird on the 22nd 1960, one bird on July 8th 1962 and one bird present from August 1st to 25th 1965.

Grey Phalarope *(Phalaropus fulicarius)*

An extremely rare vagrant. There are two records of single birds on October 1st 1947 and from August 26th to September 5th 1961.

Red-necked Phalarope *(Phalaropus lobatus)*

An extremely rare vagrant with only one record of a bird in full breeding plumage on June 12th 1963.

Arctic Skua *(Stercorarius parasiticus)*

A very rare vagrant of which there are two reports. A single bird on November 4th 1961 and two birds on October 13th 1963.

Great Black-backed Gull *(Larus marinus)*

Present during winter and spring in numbers up to 150 birds with occasional influxes in spring of up to 500+ birds. These taper off by May when, except for odd birds, none are present until mid September when the first winter visitors arrive. These build up to about 150 birds by late December.

Lesser Black-backed Gull *(Larus fuscus graellsii)*

Present during winter and spring, with numbers in January and February of up to 500+ birds, decreasing throughout March into April (when there are usually signs of passage through the area) as numbers rise up to c400 birds in some years. Occasionally some birds remain throughout the summer, being later joined by the usual autumn passage which starts

in early July, peaking in late September when up to 7,000 birds have been reported. Numbers then drop away in November and December (c4,000 on November 1st 1953 being the exception) to c500 birds by the years end.

Birds of Scandinavian race *(Larus fuscus fuscus)* are recorded occasionally in autumn and winter.

Herring Gull *(Larus argentatus)*

Present in all seasons with an early roost of up to 3,000 birds in January and February, decreasing to less than 10 birds which usually remain throughout May, June, July and August. Numbers rise again in September and October to peak around c3,000 birds (c4,000 birds on October 2nd 1973 being higher than usual) in November and December.

Common Gull *(Larus canus)*

Another species present throughout the year. The early winter roost is generally smaller than the later one, but still reaches up to 3,000+ birds. Numbers then fall to 15+ birds which remain in the summer months. These birds are joined in August and September by the beginnings of the autumn influx and wintering numbers (which total up to 7,000 birds) falling in November and December to c3,000 (5,000 birds on December 25th 1966 were exceptional).

Glaucous Gull *(Larus hyperboreus)*

A rare vagrant, with only three records of singles on November 29th 1959, November 3rd 1960 and April 1st 1967. (This species could well have been overlooked in the light of the increase in the numbers of records of this species recorded inland in the country).

Iceland Gull *(Larus glaucoides)*

Another rare vagrant of which eight records exist. All are of single birds, in February 26th 1938, January 4th 1947, January 29th 1949, December 23rd 1957, December 18th 1959, January 23rd 1960, May 23rd 1962 and September 2nd 1965.

Little Gull *(Larus minuta)*

A scarcely reported vagrant, with only six records. One bird on October 14th 1950, one bird on October 7th 1958, one bird on December 9th 1962, two birds on May 6th 1973 and single birds present on May 7th and July 18th 1974.

Black-headed Gull *(Larus ridibundus)*

By far the commonest of the gulls in the winter gull roost. Present throughout the year with a winter maximum of between 10,000 and 20,000 birds frequently reported. The decrease in spring to less than twenty birds and the rise in August and September follows much the same pattern as in Common Gull.

Kittiwake *(Rissa tridactyla)*

Reported regularly, with some twenty records in all up to 1966, but only on May 18th 1975 since. Most occurrences were single birds, with two birds noted on February 25th 1959, March 21st 1961 and December 8th 1963.

Gull Roost: Many reports are received of the estimated number of birds present rather than specific counts for each species, notable ones being c15,000 on December 13th and 14th 1952, c12,000 on November 28th 1953 and in 1969 the number at the year's end was put at 60,000 to 70,000 birds.

Black Tern *(Chlidonias niger)*

A fairly regularly reported spring and to a lesser extent autumn passage migrant, with generally less than five birds involved. The exceptional number of 35 birds were present on May 10th 1954.

Common *(Sterna hirundo)* **and Arctic** *(Sterna paradisea)* **Tern**

A regularly reported migrant, occasionally recorded in spring but more frequently in autumn, involving usually more than just single birds. Parties of up to six birds are regularly seen. Larger numbers reported include 12 birds on August 8th 1961, 19 birds on May 29th 1962, 12 birds on June 5th 1963 and 15 birds on August 12th 1973.

Sandwich Tern *(Sterna sandvicensis)*

A very rare vagrant. One record of a bird on October 20th 1963.

Little Auk *(Plautus alle)*

A very rare storm driven vagrant, with three records. Single birds occurred on April 12th 1950, October 16th 1955 and November 16th 1957.

Stock Dove *(Columba oenas)*

Regularly recorded in the area and present all the year in small numbers. Breeding has rarely been proved. There is usually an influx in autumn when birds mix with Woodpigeons in flocks on the fields or Eccup Moor, and may reach up to 40 birds (as in 1959) or c30 as in December 1970.

Woodpigeon *(Columba palumbus)*

Present throughout the year, c25 pairs breeding. During January and February flightlines to roosting areas pass over the Reservoir and large numbers are sometimes present in the surrounding fields or on Eccup Moor. Up to 4,600 birds (as on January 23rd 1961) have been noted, though numbers are generally much smaller and range between 500 and 1,000 birds. Autumnal flocks are usually much smaller and in some years non existent.

Turtle Dove *(Streptopelia turtur)*

Only occurs as a spring and autumn passage migrant, usually in singles, though up to three birds have been noted. Occasionally birds are present throughout the summer, and a pair bred in 1958.

Collared Dove *(Streptopelia decaocto)*

Not recorded until the mid sixties. Since then has been reported regularly in singles and pairs, breeding nearby on a housing estate, and using the surrounding fields in which to feed.

Cuckoo *(Cuculus canorus)*

A spring and autumn passage migrant with some birds summering in the area. Most records are of single birds, usually in May, June, July and August. One bird on September 6th 1964 was the latest reported.

Barn Owl *(Tyto alba)*

A very rare visitor to the area due to its general decline. Reported in 1961 (in Eccup village during July and also seen in August and September), 1962 (one bird seen on February 4th, May 27th, June 17th, July 17th, October 7th, November 5th and December 2nd), 1963 (on only two dates), and in 1965 when a bird was reported as having been shot in the village and strung up on a fence. It was again noted in the vicinity of the village in late 1974 and a pair was frequently seen and bred there in 1975.

Little Owl *(Athene noctua)*

Breeds in nearby Harewood Park, and certainly on Eccup Moor, consequently birds are frequently reported in the area, occasionally roosting in the South Woods.

Tawny Owl *(Strix aluco)*

The commonest Owl of the area, which is resident, with up to three birds present at any one time. One pair regularly breeds at the eastern end of the Reservoir.

Long-eared Owl *(Asio otus)*

There is only one record of this very scarce and local bird, which is a vagrant to the Leeds area. One bird was present on December 3rd, 9th and 10th, 1961.

Short-eared Owl *(Asio flammeus)*

An unusual visitor to the area. There are records on March 23rd, July 29th and 31st and August 1st, 7th and 11th 1961, October 16th 1966, mid February 1967 and on September 24th 1972. All sightings were of single birds.

Swift *(Apus apus)*

A summer visitor, usually arriving in early May (the earliest being April 27th in 1962 and 1969) and leaving in mid August. Passage is sometimes quite marked with numbers in spring of up to 150 birds, and even more so in autumn, when up to 340+ birds (as on August 6th 1962) have been reported.

Alpine Swift *(Apus melba)*

There is one record of this very rare vagrant, that of a bird on June 4th 1960.

Kingfisher *(Alcedo atthis)*

An occasional visitor to the area, always reported singly, and chiefly in the autumn and winter months.

Green Woodpecker *(Picus viridis)*

Was recorded fairly regularly in former years, especially the fifties and early sixties when records covered most months of the year. Since the drastic decline in the Leeds area after the 1962-63 winter the species has only been sighted on five occasions, once in 1964 and on four dates in the autumn of 1975.

Great Spotted Woodpecker *(Dendrocopos major)*

Regularly recorded in the area, reports covering every month of the year, with up to 4 birds, though usually only singles. Despite the frequency with which the species is recorded, breeding has never proved, little suitable nesting habitat existing.

Lesser Spotted Woodpecker *(Dendrocopos minor)*

An irregular visitor to the area, recorded on August 1st and 18th and September 22nd 1961, December 22nd 1962, August 25th 1963, February 6th 1965, February 25th 1968 and May 2nd 1973. All reports were of single birds.

Wryneck *(Jynx torquilla)*

A very rare vagrant with one record of a bird which was present from August 31st to September 5th 1960.

Skylark *(Alauda arvensis)*

Resident and a fairly regular breeder (up to c20 pairs) on open ground, with some evidence of passage movement. Flocks in the winter numbered up to c250 as on February 14th 1954 prior to the hard winter of 1962-63. In 1963 c390 were recorded on December 22nd, the only flock apart from 150-200 birds in 1966 of over 100 birds which has been reported since.

Shore Lark *(Eremophila alpestris)*

Another very rare vagrant. Two birds in the company of Skylarks on January 24th 1960 is the only record.

Swallow *(Hirundo rustica)*

A regular summer visitor arriving in mid April (the earliest being April 2nd 1961), and departing in early October (the latest being October 22nd 1961 and 1967). Spring passage is

usually small and rarely reaches figures in excess of 100+ birds daily, whilst autumn passage, which begins in mid July, regularly reaches figures of c250 birds. The largest number recorded was 554 which flew S.W. on August 24th 1961. One or two pairs attempt to breed, usually successfully.

House Martin *(Delichon urbica)*
A regular summer visitor arriving in mid April (the earliest being April 2nd) and leaving in late September or early October (2 on October 22nd 1973 being the latest). The spring passage is smaller than that of the Swallow, numbers rarely reach above c75 birds. Autumnal passage is also smaller than Swallow, but totals of up to 170 birds on occasions have been noted, with large parties often remaining into late September (c150 birds on September 30th 1973 and c75 birds on October 6th 1974).

Sand Martin *(Riparia riparia)*
Another regular summer visitor but in far less numbers than the previous species. The earliest arrival recorded was on March 28th 1967. Mid April is more usual, with only small numbers involved (35 birds on April 27th 1961 being a maximum). Autumn passage is more marked, and lasts from mid July to early September involving numbers up to 75 birds. The latest bird reported was seen on September 30th 1969.

Carrion Crow *(Corvus corone)*
Resident, with c5 pairs breeding in the area. Influxes usually occur in winter from November to March, and total up to 50+ birds on occasions. Predation by the species is frequently reported on many different species.

Hooded Crow *(Corvus corone cornix)*
A rare winter vagrant of which there are four records. These are all of single birds, on October 15th 1952, October 18th 1953, February 13th 1954 and March 4th 1960.

Rook *(Corvus frugilegus)*
Principally recorded in flightlines along with Jackdaws in a west to east direction in the evening during the winter months in numbers of up to 8,000 birds (as on November 20th 1961). The species breeds nearby in small Rookeries off Lakeland Drive, in Eccup village and in a much larger Rookery (up to 120 nests) at Five Lane Ends, Adel.

Jackdaw *(Corvus monedula)*
Like the former species principally reported on the flightlines. Present in all seasons, a few pairs nesting near Eccup villages and in the woodland of Wigton Knowle and High Wood at the eastern end of the Reservoir.

Magpie *(Pica pica)*
A resident species with up to 5 pairs breeding. Numbers during the winter months increase slightly, up to c25 birds. Like the Carrion Crow predation on other species is common.

Jay *(Garrulus glandarius)*
Another resident species of which one or two pairs breed, usually at the less frequently visited eastern end of the Reservoir (Wigton knowle), and only occasionally in the Main Wood at the western end. Parties of up to ten birds occur in autumn and winter.

Nutcracker *(Nucifraga caryocatactes)*
An extremely rare vagrant of which there is one record. Three birds were present on November 1st 1955.

Great Tit *(Parus major)*
Resident, with up to seven pairs breeding, most commonly at the eastern end of the Reservoir. Parties of Tits during autumn and winter often roam through the area, and numbers of up to 20 Great Tits are recorded amongst them.

Blue Tit *(Parus caeruleus)*
The commonest of the Tits which is resident with up to fifteen pairs breeding and wintering numbers of up to 50+ birds.

Coal Tit *(Parus ater)*
Another resident species, of which two or three pairs breed. Autumnal parties are regularly noted and contain up to c25 birds, as on August 12th 1973.

Marsh Tit *(Parus palustris)*
Formerly regularly reported in all months of the year with up to 8 birds (as on January 8th and March 4th 1961) as a maximum. In more recent years the species has decreased slightly, but breeding was proved in 1973, 1974 and 1975.

Willow Tit *(Parus montanus)*
Not as common as the former species, but regularly recorded in all months of the year, more frequently in the winter, when birds are noted in the Tit flocks which roam the area. A pair bred at both the Reservoir and on Eccup Moor in 1970, the only proved breeding records for the area.

Long-tailed Tit *(Aegithalos caudatus)*
A resident species which occasionally breeds. Prior to the 1962-63 winter it was a common bird of the area and parties of up to 15+ birds were regularly seen. During 1963 however, there were only twelve records of the species. Since then it has steadily increased, and is now back to its previous status, with flocks of up to c20 birds being reported, mainly in autumn and the winter months when there is an influx into the area.

Nuthatch *(Sitta europeae)*
Formerly a breeding species, but during the late fifties and sixties it decreased its status, and, apart from 1961 when up to three birds were seen at the eastern end, all reports are of single birds. Apart from a bird on November 3rd 1974, the species has not been reported since 1962-63 winter.

Treecreeper *(Certhia familiaris)*
A resident species of which two or three pairs breed. Birds are frequently met with in Tit parties in the winter when numbers in the area have risen up to a maximum of 13 birds, as on February 24th 1960.

Wren *(Troglodytes troglodytes)*
A resident species which decreased dramatically after the 1962-63 winter (there were only thirty-seven reports in 1963 with a maximum of 4 birds). It has since increased and is now more common than in the pre-1962-63 years, with up to ten pairs breeding.

Dipper *(Cinclus cinclus)*
An occasional winter visitor to the area, which was reported in 1961 on no fewer than twentyfive dates with a maximum of 3 birds on September 16th. However it has only been recorded once on September 12th 1963 since the hard 1962-63 winter. A bird attempting to sing on Eccup Moor on December 10th 1967 was very unusual.

Mistle Thrush *(Turdus viscivorus)*
Resident, up to five pairs breeding in the area. Numbers in autumn and winter rise as post breeding assemblies occur, reaching up to 57 birds, as on September 1st 1963.

Fieldfare *(Turdus pilaris)*

A winter visitor arriving in mid October, the earliest being a bird on September 28th 1962. A second wave of incoming birds usually occurs in early November. Numbers at this time are c350 birds in mid October, and up to c1,000 birds in November (as on the 1st 1959). Most of the birds move on, leaving less than 100+ by the years end, and this trend is carried over into January and February (660 birds on January 22nd 1961 being the exception). In March and early April numbers usually increase (up to c350 birds) prior to leaving. (c2,500 Fieldfares and Redwings on April 11th 1953 is the largest party ever noted in the Leeds area.) Birds sometimes linger into late April, one on May 8th 1974 being the latest recorded.

Song Thrush *(Turdus philomelos)*

A resident species with up to seven pairs in the area, but nothing like as common as the Blackbird. As with other Thrushes, influxes are noted in autumn and winter when up to c30 birds are recorded frequently. 45 birds on October 6th 1961 is the maximum reported.

Redwing *(Turdus iliacus)*

Status generally as Fieldfare, but in lesser numbers. Arrives in mid October, the earliest recorded being four birds on September 22nd 1968, in numbers of up to 350 birds. Many of these birds remain in the area during December and January. February and March usually see a build up prior to leaving, involving up to 350 birds. These birds have left by early April, leaving just small parties which in turn have left by mid April; two birds on April 29th 1974 are the latest recorded.

Ring Ousel *(Turdus torquatus)*

A scarce vagrant encountered on passage only, of which there are five records of single birds on May 1st 1960, in mid May and July 10th 1961, September 25th 1966 and April 7th 1974.

Blackbird *(Turdus merula)*

A resident species which increases in the autumn and winter months due to influxes, involving probably some continental birds, to parties of up to 60+ birds. Breeding numbers total up to c20 pairs.

Wheater *(Oenanthe oenanthe)*

A spring and autumn passage migrant, usually arriving in early April, the earliest being March 2nd 1966; and continuing throughout April into May with up to 17 birds reported. Returning birds are recorded in late July to September, with a maximum usually in mid August of up to 8 birds. Some birds linger into October, but one on November 12th 1955 was very late, and by far the latest ever recorded in the Leeds area.

Stonechat *(Saxicola torquata)*

An unusual vagrant recorded in spring and more frequently in autumn. Reports of birds come from October 2nd and 12th 1960, March 4th, 5th, 13th and 14th and a pair on October 11th 1961, one bird on October 14th 1962, one bird on October 3rd 1965 and one bird on September 23rd 1973.

Whinchat *(Saxicola rubetra)*

Formerly a breeding species (in 1958 and 1959) but now confined to spring and autumn passage. The earliest arrival date is April 21st 1960, when two birds were present. Passage numbers are low in spring with five birds being the maximum, whilst the autumn figures, which occur from early July to September, are far higher with 14 birds on September 7th 1962 as a peak. The latest report is of two birds on October 3rd 1965.

Redstart *(Phoenicurus phoenicurus)*

Another species which formerly bred in the area but is now only a spring and autumn passage bird (in very restricted numbers since 1970 when a drastic decline of the species was noted in the Leeds area). Arriving in late April (one bird on April 4th 1961 is the earliest report) and May, with only small numbers involved, the species like the Whinchat is more evident on autumn passage when up to 10 birds have occurred. The latest report is that of a single bird which was present on September 22nd 1968.

Nightingale *(Luscinia megarhynchos).*

A very rare vagrant, one bird on July 5th 1959 being the only record.

Robin *(Erithacus rubecula)*

A resident species of which up to twelve pairs probably breed, and, like most of the Thrushes a winter visitor to the area in numbers of up to 40 birds.

Grasshopper Warbler *(Locustella naevia)*

A spring and autumn passage migrant, more frequent in spring when birds are fairly regularly seen and heard in May. Autumn passage is confined to late July and the first week in August.

Sedge Warbler *(Acrocephalus schoenobaenus)*

A spring and autumn passage migrant which has not been reported since 1965 because the woodland on the northern side of the Reservoir has matured and is no longer suitable habitat for the species. Birds were regularly recorded in late April and early May, and in 1961 a pair were present in the area throughout the breeding season, but breeding was not proved. Birds rarely linger in the area, one on September 2nd 1961 being the latest.

Blackcap *(Sylvia atricapilla)*

A summer visitor which arrives in late April (April 12th 1964 being the earliest) and departs in late August (September 26th 1974 being the latest). Numbers vary from year to year, with one or two pairs breeding during the years when numbers are high. Wintering in the area has only been noted in 1971, when a male bird was recorded on October 17th and November 15th.

Garden Warbler *(Sylvia borin)*

Another spring and autumn passage migrant which, due to unsuitability of habitat, usually passes through the area and rarely breeds. Birds have however been noted from April to mid September.

Whitethroat *(Sylvia communis)*

A summering species, also a spring and autumn passage migrant which arrives in April, the earliest being April 2nd 1961. Departs in late August or early September, the latest being September 18th 1962. Formerly up to five pairs bred, but now only one or two pairs do so. Autumn passage is usually more marked than that of spring, 14 birds on June 30th (probably some post breeding birds), and 11 in early August of 1963 is the maximum number reported.

Lesser Whitethroat *(Sylvia curruca)*

Purely a spring and autumn passage migrant arriving in early May, and has been recorded in June, July, August and very occasionally early September. Most reports are of single birds, two birds having only been noted from July 31st to August 7th 1960.

Willow Warbler *(Phylloscopus trochilis)*

The commonest Warbler, arriving in early April (two birds on March 25th 1963 being very early) and which breeds, with up to 32 singing males (as in 1969). Autumn passage swells the number of birds present, up to c70 birds having been noted. This passage continues into mid

September by which time most birds have left. Occasionally some are noted into October, as in 1955 when several birds were present on the 9th.

Chiffchaff *(Phylloscopus collybita)*

Usually the first of the Warblers to arrive in spring, frequently reported in late March, March 20th 1961 being the earliest. Birds are recorded in April, May and June but no breeding has ever been proved, and it is doubtful if the species does breed. Autumn passage is less defined than spring, with only odd birds occurring, the latest of which was noted on October 17th 1965.

Wood Warbler *(Phylloscopus sibilatrix)*

Only recorded as an autumn passage migrant during the late fifties and early sixties, but may well occur in spring in some years. The species is not common in the Leeds area since it's gradual decline in the fifties, and most records are of single birds.

Goldcrest *(Regulus regulus)*

Formerly only a winter visitor with arrivals taking place in October and November and in numbers of up to c40 birds. The severe winter of 1962-63 dealt the species a hard blow and numbers for the next three years never reached above twenty birds. It has since returned to the numbers encountered prior to 1962-63. Breeding has occurred infrequently but only in small numbers, probably less than three pairs.

Firecrest *(Regulus ignicapillus)*

An extremely rare vagrant inland, as is shown by the fact that a bird on November 15th 1962 was then only the second record for the West Riding since 1878.

Spotted Flycatcher *(Muscicapa striata)*

A spring and autumn passage migrant arriving in early May with numbers of less than four birds. Usually one pair, occasionally two, remain and breed in the area. Autumn passage is more pronounced with numbers of up to 8 birds reported quite frequently (30 birds on August 29th 1963 was an exceptionally high number), and lasts into mid September. One bird on October 1st 1967 is the latest reported.

Pied Flycatcher *(Ficedula hypoleuca)*

A very scarce spring and autumn passage migrant which has occurred on August 22nd and September 11th 1959, August 13th 1961, May 13th, late August and September up to the 7th 1962 and April 25th 1971.

Dunnock *(Prunella modularis)*

A resident species which breeds in numbers of up to ten pairs and whose status appears to be static, little change having taken place since the early fifties. Slight increases are occasionally noted in some years during autumn and winter (16 birds on Eccup Moor in February and April of 1966 were regarded as abnormally high).

Meadow Pipit *(Anthus pratensis)*

A species which occasionally breeds in very small numbers on the embankment around the Reservoir, but more often on nearby Eccup Moor in numbers of up to ten pairs. It is also an autumn and winter visitor to the area. Numbers of up to 250 birds have been recorded but more usually c50 birds are to be found. Hard weather movement is frequently noted involving anything up to 275 birds, as on October 1st 1961.

Tree Pipit *(Anthus trivialis)*

A summer migrant which arrives in late April, the earliest being one bird on April 3rd 1953. Two or three pairs used to breed at the western end of the Reservoir in "Willow Corner" but due to a change in habitat no longer do so. However, since 1971, a pair has bred

on the rough ground beside the golf course. Most birds have left the area by early September, few stopping as late as the two birds which were present on October 13th 1961.

Rock Pipit *(Anthus spinoletta petrosus)*

A scarce vagrant of which there are seventeen records from October 1959 until January 1968, after which there have been no reports. The maximum sighted were 4 birds on January 7th 1968.

Pied Wagtail *(Motacilla alba yarrelli)*

A resident species which breeds in most years. Spring passage usually occurs in late March and early April with up to ten birds involved on any one day, whilst the autumn passage starts in early August and goes on until early October, with up to 30 birds as a maximum. Four or five birds usually remain in the area throughout the winter.

The continental sub-species *(Motacilla alba alba)* is occasionally recorded in both spring and autumn.

Grey Wagtail *(Motacilla cinerea)*

Another resident species of which up to six birds are recorded outside the breeding season, three birds being more normal. Breeding has occurred, but infrequently.

Yellow Wagtail *(Motacilla flava flavissima)*

A spring and autumn passage migrant which arrives in late April (one on April 11th 1966 is the earliest reported) and departing in early September. Odd birds do linger and one such bird occurred on October 8th 1967. Spring migration only concerns numbers of less than five birds, whereas the autumn passage involves numbers of up to twenty birds (regularly up to ten birds). Occasionally a pair breeds.

Waxwing *(Bombycilla garrulus)*

An occasional winter visitor to the area especially when there are large "irruptions". When reported it is usually in small numbers of less than ten birds, and has been noted in 1957, 1959, 1961, 1963, 1965 and 1966 with no sightings since.

Great Grey Shrike *(Lanius excubitor)*

A very scarce winter visitor, there being one record of a bird near Eccup village on November 28th 1971.

Starling *(Sturnus vulgaris)*

A resident species which breeds in limited numbers at the western end of the Reservoir due to the lack of suitable nest sites, but more commonly at the eastern end. It is also a winter visitor. Large numbers sometimes occur (10,000 birds were roosting on the northern side of Reservoir on September 23rd 1968). The area is also on a flight path to nearby roosts, thus large parties of up to c12,000 birds as on February 23rd 1968 have been noted.

Hawfinch *(Coccothraustes coccothraustes)*

A locally scarce vagrant, most often reported in autumn and winter and only occasionally in spring. Recorded in 1949, 1954, December 1957, November 1959, March, April and October 1960, September, October and November 1961, January and April 1962, February and March 1963 and February and March 1964 but not since. Most reports are of single birds though up to four have been noted and usually seen in the hawthorn hedges in the fields on the south side of the Reservoir.

Greenfinch *(Carduelis chloris)*

A resident Finch but only in small numbers, one or two pairs breeding in most years. In the past it was solely a wintering bird with many flocks occurring of up to c300 birds. These may well have been part of the large flock which regularly wintered in Harewood Park. More

recently smaller numbers have been noted as the species is more widespread in the Leeds area through the winter. Flocks of 100 birds are not unusual however.

Goldfinch *(Carduelis carduelis)*

A regular visitor but in varying numbers to the area from August to April. The species is not usually present during the breeding season though a pair was suspected but not proved of breeding in 1965. During the winter, flocks may number 25 birds, as on October 15th 1961, but more regular reports are of ten or less birds.

Siskin *(Carduelis spinus)*

A regular winter visitor but like the last species varying in numbers from single birds to flocks of up to 30. Most birds arrive in mid October and remain until late March, but in 1961 four birds were present on September 13th (very early), whilst in 1975 a male bird was noted on April 27th. In 1957 two males were heard singing on February 24th as was one on March 31st 1974.

Linnet *(Acanthis cannabina)*

A resident species which breeds both on the rough ground and gorse on the golf course and near Eccup village, five plus pairs in all. Like many Finches it is an autumn visitor with quite large flocks occurring in most years during July, August and September, often numbering 200 birds. These birds leave the area by mid October. Any which remain during the winter total less than twenty birds.

Twite *(Acanthis flavirostris)*

A rare vagrant to the area, recorded on three occasions only. Two birds were present on March 24th 1950, one on November 30th 1959 and three on September 16th 1962.

Redpoll *(Acanthis flammea cabaret)*

A resident species which breeds, c30 males counted singing in the spring of 1967. Wintering numbers usually total less than twenty birds (48 birds on January 15th 1961 being high), these birds being joined by the usual spring influx in late March when up to 100 birds may be present. In autumn post breeding flocks occur, with numbers around the 50 mark, though occasionally, as high as 100 birds.

Bullfinch *(Pyrrhula pyrrhula)*

Another resident species which breeds in small numbers, usually one or two pairs, though not every year. Autumnal and winter parties are frequently reported, but never in greater numbers than 15 birds.

Crossbill *(Loxia curvirostra)*

A regular visitor chiefly to the Main Wood at the western end of the Reservoir, at any time from July to the year end. Birds have been recorded in January, February, May and June but far less frequently and in smaller numbers. Most sightings refer to numbers of less than ten birds though parties of up to 25 birds (as on July 7th 1962) have been noted.

Chaffinch *Fringilla coelebs)*

The commonest Finch of the area, which is resident, with up to twelve pairs breeding, and is regularly reported in the autumn and winter months in small flocks or with parties of other Finches. Most flocks number less than twenty birds though parties of 35 birds on March 26th, 47 birds on October 15th 1961 and c50 birds on December 25th 1966 have been recorded.

Brambling *(Fringilla montifringilla)*

A regular winter visitor to the area, arriving usually in mid October (though there are records for mid September), and moving on to more favourable localities by early November.

It is during the first months of the year that the bird is usually most common, with parties of up to 15 birds frequently recorded into late March. Birds sometimes remain into April, 20 birds on April 29th 1961 being the latest. Although the majority of records refer to numbers of less than twenty birds, larger flocks have been noted such as c50 birds on October 24th 1954 and 60+ birds in February of 1967.

Yellowhammer *(Emberiza citrinella)*

A resident species of which five plus pairs regularly breed. During autumn and winter there is usually an influx of birds into the area, sometimes numbering up to 45 birds, though more regularly between 15 and 25 birds and often remaining right through to the spring.

Corn Bunting *(Emberiza calandra)*

A species which is usually absent throughout the autumn and winter months, arriving in early March. Formerly up to five pairs bred but it has declined in recent years with the growth of the trees on the northern side of the Reservoir and now only one pair breeds. The maximum number ever recorded is 35 birds, which were present on March 6th 1960.

Reed Bunting *(Emberiza schoeniclus)*

Another species which formerly bred (up to five pairs) but since the growth of the trees on the northern side of the Reservoir now only spasmodically. One pair bred in 1974. During the winter months there is frequently an increase in numbers which can total up to c50 birds.

Lapland Bunting *(Calcarius lapponicus)*

A very scarce vagrant of which there are two records both of single birds. One bird which flew west on October 9th 1962 was the first for the area, and one bird was with Skylarks on December 22nd 1963.

Snow Bunting *(Plactrophenax nivalis)*

A very scarce vagrant, but not quite as rare as the last species. There are eleven records of birds reported as follows: One flew west on December 15th and three flew south-east on December 31st 1959, 12 were present on January 31st 1960, one on November 25th and three on December 31st 1961, one on January 26th, November 30th and December 6th with two on November 25th and 30th 1962 and one bird on December 26th 1966.

House Sparrow *(Passer domesticus)*

A resident species which breeds and whose status has changed little since the fifties. During the autumn and winter flocks occur with anything up to 500 birds in them regularly. Though 1,500 birds, which were present in late August 1965 on Eccup Moor, represent a maximum, it is an exceptionally high number.

Tree Sparrow *(Passer montanus)*

A resident species of which up to ten pairs breed in the area and which, like the House Sparrow, is a winter visitor to the locality, sometimes in large numbers such as the 300 birds which were present on December 11th 1966. More regularly figures in the region of 100 to 150 birds are noted.

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ACULEATE HYMENOPTERA IN THE DONCASTER DISTRICT

J. T. BURN

This is a continuation of the work initiated by Corbett (1919) in which he listed over 30 species from a Doncaster sand pit. Due to urban expansion the sand pit at Bessacar, in which Corbett's study was carried out is now built upon, but there are still numerous old sand quarries around Doncaster having a similar Aculeate fauna to that which Corbett studied.

Most of my collecting during 1973 was carried out at Carrside (Hatfield Lings), an ideal place for aculeates as can be seen from the following list and a place that would be profitable for studying other groups. It is one of the best sandy heaths with old sand quarries in the area, with plants such as *Ulex*, *Erica*, *Sarothamnus*, *Pteridium* and *Calluna* in profusion. In the higher wood the combination of *Tilia parviflora* and *Taxus*, growing here on glacial drift overlying Bunter Sandstone, is remarkable. The remaining woods in South Yorkshire containing these tree species are apparently confined to the Magnesian Limestone (Phillips, 1973).

Among the species Corbett listed was *Panargus ursinus* auctt, of which he only saw one specimen. This species, which forms large colonies, seems fairly abundant at Hatfield Lings but is not so common at Holme House. One can often come across them stretched out in flower heads. Two species of *Colletes* were recorded from Bessacar, *C. fodiens* Kirb. and *C. daviesanus* Smith. At Hatfield, *Colletes* species are extremely common and both species should occur there. I have taken *Epeolus variegatus* Linn., a well known parasite of *C. fodiens* Kirby (Yarrow, 1943), at the entrance to a *Colletes* burrow at Hatfield Lings.

List of Species

The usual symbols indicate county (†) and vice county (*) records. Initials of collectors are as follows: J. T. Burn, C. J. Devlin, C. A. Howes, P. Skidmore. Map references for localities given are: Blaxton Common SE 69-01-, Carrside, Hatfield Lings, SE 657075; Holme House, SE 66-058; Potteric Carr, SE 59-00; Rossington Bridge, SE 62-99-; Sandall Beat Wood, SE 59-01-; Thorne Moors, SE 71-16—.

**Bethylus fuscicornis* Jur. Sand pit, Carrside, Hatfield, 22/7/73; J.T.B.

Notozus constrictus Foerst. Sand pit, Carrside, Hatfield, 21/6/73; J.T.B.

**Hedychridium ? ardens* Coq. Hatfield, Carrside, 21/6/73; J.T.B.

Omalus auratus Linn. Armthorpe, on privet in garden, abnormally large specimen, 3/7/73; J.T.B.

Chrysis ignita Linn. Nr. Blaxton Common, 12/8/72; J.T.B. Also at Sandall Beat and Potteric Carr.

**C. cyanea* Linn. Sandall Beat, 2/8/70, Blaxton Common, 17/7/72; J.T.B. Doncaster, June; P.S.

Myrmosa atra Panz. Sand pit, Carrside, Hatfield, male, 21/6/73; J.T.B. Female, 9/9/73; P.S. Doncaster, -/8/70; C.D.

**Ponera punctatissima* Roger Queen. Sand pit, Carrside, Hatfield, 22/7/73; J.T.B.

Myrmica scabrinodis Nyl. Queen, Sand pit, Carrside, Hatfield, 22/7/73; J.T.B.

M. ruginodis Nyl. Workers, Thorne Moors, 15/7/73; J.T.B.

Priocnemis exaltatus Fab. Armthorpe, old part of colliery tip, 31/8/72; also at Holme House Armthorpe, 13/8/72.

Ancistrocerus pictus Curt. Sandall Beat Wood, Armthorpe, 5/6/73; J.T.B.

Vespa vulgaris Linn. Very common everywhere.

V. germanica Fab. Another common species.

V. rufa Linn. Equally common in the area.

V. sylvestris Scop. Fairly abundant in the area.

Tachysphex pompiliformis Panz. Sand pit, Carrside, Hatfield, dragging large grasshopper, 5/7/73; J.T.B.

Trypoxylon figulus Linn. Sandall Beat Wood, 5/6/73; and near Blaxton Common, 12/7/72; J.T.B.

T. attenuatum Smith Holme House, Armthorpe, 10/8/72; J.T.B.
†*Podalonia affinis* Kirby Carrside, Hatfield, 7/6/73 and 21/6/73; J.T.B.
Pemphredon lugubris Fab. Taken from Holme House, Sandall Beat, Blaxton Common and Carrside; J.T.B.
Mimesa bicolor Jur. Abundant at Holme House and Carrside, Hatfield; J.T.B.
M. dahlbomi Wesm. Apparently rare, only one other Yorkshire record, sand pit, Carrside, Hatfield, 21/6/73; J.T.B.
Oxybelus uniglumis Linn. Very common at Holme House and Carrside.
Crabro cribrarius Linn. Common at Holme House and Carrside.
C. peltarius Von Schr. Another abundant species at Holme House.
Coelocrabro leucostomoides Rich. Armthorpe, 28/7/70; J.T.B.
C. capitosus Shuck. Rare, Armthorpe, 31/7/65; P.S. 28/7/70; J.T.B.
Hoplocrabro quadrimaculatus Fab. Holme House, Armthorpe, 3/8/72, abundant J.T.B.
Metacrabro quadricinctus Fab. Abnormally minute specimens near Blaxton Common, 12/7/72; J.T.B.
Crossocerus anxius Wesm. Rare, Holme House, 3/8/72 and 10/8/72; J.T.B.
C. varius Lep. Holme House, 4/6/73; J.T.B.
Solenius continuus Fab. Potteric Carr, Bessacar, 3/6/72, Thorne Moors, 20/8/72; J.T.B.
Corynopus coarctatus Scop. Rare, Potteric Carr, Bessacar, 3/6/73; J.T.B.
Lindenius albilabris Fab. Sand pit, Carrside, Hatfield, 1/7/73; J.T.B.
**Entomognathus brevis* Lind. Sand pit, Carrside, Hatfield, 1/7/73; J.T.B.
†*Nysson trimaculatus* Ross. Holme House, Armthorpe, 10/8/72; J.T.B.
**Spilomena troglodytes* Lind. Thorne Moors, 3/4/72; P.S.
Gorytes mystaceus Linn. Near Finningly, 5/6/73; J.T.B.
**Hoplisus quadrifasciatus* Fab. Holme House, Armthorpe, 3/8/72, 30/7/73; Thorne Moors, 20/8/72; J.T.B.
**Mellinus arvensis* Linn. Very common in august at Holme House and Carrside.
Colletes fodiens Geof. Holme House, 10/8/72; Carrside 5/7/73; J.T.B.
C. daviesana Sm. Near Blaxton Common, 12/7/72; J.T.B.
Halictus rubicundus Chr. Common in most localities.
Sphecodes gibbus Linn. Common at Hatfield and Holme House, J.T.B.
S. pellucidus Smith. Occurs at Hatfield and Holme House; J.T.B.
Andrena flavipes Panz. Holme House, 10/8/72; J.T.B.
A. barbilabris Kirb. 2/5/72, Holme House; J.T.B.
A. clarkella Kirb. Holme House, 2/5/72; J.T.B.
†*A. bucephala* Steph. Holme House, 2/5/72; J.T.B.
**A. ruficrus* Nyl. Holme House, 17/4/72; J.T.B.
A. nigroaenea Kirb. Holme House, 17/4/72; J.T.B.
A. saundersella Perk. Thorne Moors, 3/6/72; J.T.B.
A. denticulata Kirb. Holme House, 10/8/72; J.T.B.
A fulva Schr. Holme House; 2/5/72; J.T.B.
A. varians Rossi. Sand pit, Carrside, Hatfield, 5/7/73; J.T.B.
A. haemorrhoa Fab. Very common at Holme House and Carrside.
†*Melitta leporina* Panz. Armthorpe, a fair number in garden, 4/7/73; J.T.B. Rossington Bridge, 15/7/65; P.S.
Panurgus ursinus auct. A local species, occurring at Holme House and Carrside; J.T.B.
**Anthophora furcata* Panz. Thorne Moors; P.S. Armthorpe; J.T.B.
Epeolus variegatus Linn. Carrside, Hatfield, 12/8/73; J.T.B.
E. cruciger Panz. Near Blaxton Common, 20/7/72; J.T.B.
Nomada ferruginata auct. Sand pit, Carrside, Hatfield, 21/6/73; J.T.B.
†*N. guttulata* Schenck. Thorne Moors, 3/6/72; P.S.
N. bifida Thom. Thorne Moors; P.S.
N. marshamella Kirb. Very abundant in the area.
N. flavopicta Kirb. Holme House, Armthorpe, 19/8/72; J.T.B.
N. hillana Kirb. Sand pit, Carrside, Hatfield, 7/6/73; J.T.B.

N. rufipes Fab. Holme House, Armthorpe, 10, 16 and 19/8/72; J.T.B.
Coelioxys rufescens Len. Armthorpe, resting on privet in garden, 4/7/73; J.T.B.
C. elongata Lep. Sand pit, Carrside, Hatfield, 14/6/73; J.T.B.

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FOODS OF AN ESTUARINE COMMON TERN COLONY

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The foods of a large colony of Common Tern *Sterna hirundo* (described by Greenhalgh, *Naturalist*, 121-127, 1974) on the Ribble Estuary, Lancashire were investigated in 1975 from food remains found in the colony and observations at close range of foods being carried to the young by the adults. Neither source of data is entirely satisfactory in that some foods may be missed and other over-emphasised. Fish, particularly larger species, which are easiest to see and identify in the adults' bills and which are easiest to spot in the short turf of the nesting areas, might be overestimated whilst smaller fish and shrimps would be more likely overlooked. Despite this, however, the data obtained in this survey probably give a fair indication of the relative importance of the component species.

It was apparent that diet varied according to the state of the tide so the data for foods being carried by the terns (table 1) have been separated into low tide (low water ± 2 hours), mid-tide (2-4 hours either side of low water) and high tide (high water ± 2 hours). Analysis of foods found by the nests are given in table 2.

Two fish are the dominant foods of Common Terns on the Ribble, Sprats *Clupea sprattus* predominating throughout the low and mid-tide periods when Sand Eels *Ammodytes lancea* occur in relatively small proportions. Most of these are caught in the main estuary channel or pools on the intertidal zone. Over high water however, Sand Eels form the bulk of the prey, caught entirely in the estuary where they are probably brought from inshore waters by the flowing tide.

Small Flounders *Pleuronectes flesus*, possibly with other flatfish species up to about 5cm long, comprise a small fraction of the diet; the high frequency of them in the food items found in the nest areas probably overestimated the species importance in the diet. Many of these may have been rejected by the young terns, being too large to swallow.

Shore Crabs *Carcinus maenas*, caught mostly on the intertidal zone over low water, and 'shrimps' (mostly the edible shrimp *Crangon crangon* but also the prawns *Leander serratus* and *Palaemonetes varians*) caught throughout the tide cycle are important though small components of the diet.

Table 1

Foods recorded being carried by adult Common Terns into the Ribble Estuary colony, 1975

FOOD	LOW TIDE No.	LOW TIDE %	MID TIDE No.	MID TIDE %	HIGH TIDE No.	HIGH TIDE %	TOTAL No.	TOTAL %
Sprat *Clupea sprattus*	179	70.4	118	67.4	57	20.8	354	50.3
Sand Eel *Ammodytes lancea*	31	12.2	33	18.9	186	67.9	250	35.6
Flounder *Pleuronectes flesus*	15	5.9	7	4.0	16	5.8	38	5.4
Common Eel *Anguilla anguilla*	1	0.4	0	0.0	0	0.0	1	0.1
Shore Crab *Carcinus maenas*	18	7.1	11	6.3	0	0.0	29	4.1
'Shrimps'	10	4.0	6	3.4	15	5.5	31	4.4
TOTALS	254		175		274		703	

Table 2

Foods of Common Terns found at the nest sites on the Ribble Estuary colony, 1975

FOOD	No.	%
Sprat	39	27.1
Sand Eel	55	38.2
Flounder	25	17.3
Common Goby *Gobius minutus*	2	1.4
Three-spined Stickleback *Gasterosteus aculeatus*	1	0.7
Edible Shrimp	4	2.8
Prawn:		
Leander serratus	1	0.7
Palaemonetes varians	1	0.7
TOTAL	144	

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1975

LEAVENING AND ACKLAM, V.C.61 — MAY 24th-26th

Over twenty members were present for the tea and Meeting at 'The Jolly Farmer', Leavening, at the end of this weekend, when Dr. Lloyd-Evans took the Chair. Votes of thanks were expressed to Mr. Eric Chicken and Mr. Tom Medd, who had acted as leaders on two of the days, to Miss Myra Taylor the Divisional Secretary, who had organised the weekend, and to the landowners and farmers who had granted access to their properties.

Flowering Plants (Myra Taylor)
On Saturday a good start was made to a showery day by the finding of *Crataegus oxyacanthoides* (Midland Thorn), a new vice-county record. It was found in a hedgerow alongside what was originally a Roman road and further along this it was pleasing to find *Cardamine amara* (Large Bitter-cress) at the point where the track met the Keld springs. The hillside down which the track led consisted mainly of grass fields but the upper, steeper part yielded *Thymus drucei* (Thyme), *Polygala vulgaris* (Milkwort), *Poterium sanguisorba* (Salad Burnet), *Linum catharticum* (Purging Flax) and *Carlina vulgaris* (Carline Thistle). At the foot of the hill was a regenerating wood with some conifer and here was found a small patch of *Paris quadrifolia* (Herb Paris), this record adding to the few in the vice-county. The headland of Mount Ferrant provided a change of flora to an abundance of Bracken, Anemone and Bluebell with *Ophioglossum vulgatum* (Adder's-tongue) in the grassland, also *Lathyrus montanus* (Bitter Vetch) and *Alchemilla xanthochlora* (Lady's-mantle). A few plants of *Orchis mascula* (Early Purple Orchid) and *Ranunculus auricomus* (Goldilocks) were found in the scrub and under trees on the sides. An area of marsh by a stream in the valley on the other side of the headland had *Filipendula ulmaria* (Meadowsweet), *Geum rivale* (Water Avens), *Ajuga reptans* (Bugle), *Moehringia trinervia* (Three-nerved Sandwort), *Carex hirta* (Hairy Sedge), *Valeriana dioica* (Marsh Valerian) and *Caltha palustris* (Marsh Marigold). Across the valley we moved into another tetrad; the wood and marshland there yielded much the same flora as previously, with no further additions.

On the Sunday a chalk hillside of scrub with springs and marsh proved particularly interesting. Plants found in the marsh and along the stream included *Carex dioica, Carex hostiana, Anagallis tenella* (Bog Pimpernel), *Galium uliginosum* (Fen Bedstraw), *Menyanthes trifoliata* (Bogbean) and *Pinguicula vulgaris* (Butterwort). In the scrub on the hillside above was *Cirsium eriophorum* (Woolly Thistle), *Listera ovata* (Twayblade) and *Viola hirta* (Hairy Violet); whilst in a wood over toward Leavening Brow previous records of *Lathraea squamaria* (Toothwort) and *Actaea spicata* (Baneberry) were confirmed.

On Monday the venue was a steep-sided dale near Acklam with a few springs forming a stream along the bottom and some marsh to the sides. This area was less productive of uncommon plants than had been hoped for in a region with variable geological strata. *Ophioglossum vulgatum* was found again also *Menyanthes trifoliata* (Bogbean) and *Equisetum telmateia* (Giant Horsetail), *Dactylorchis fuchsii* (Spotted Orchid) and *Viola hirta* (Hairy violet) were also recorded.

My thanks are expressed to Messrs E. Chicken, T. F. Medd, J. R.Hickson and Mrs. J. Duncan for assistance at the meeting and help in compiling the report.

Bryology (M. Dalby)
From Leavening Brow in open woodland with springs Miss Robertson recorded *Mnium seligeri, Cratoneuron commutatum, Dicranella varia, Eurhynchium striatum* and the hepatics *Marchantia polymorpha* and *Lophocolea heterophylla.*

Ornithology (M. and S. Shimeld)
Armed with Mr. Chicken's excellent map we visited a variety of habitats in Deepdale on Monday, 26th May. The weather was cold and windy on the exposed tops but the sunshine was hot in the sheltered areas. About the old chalk-pit area there were Skylarks and

Lapwings and on the upper slopes a hen Wheatear. Most notable was the number of singing cock Redstarts in old oak trees in the valley bottom and about the edges of the tall scrub and plantation. The following species were recorded in Deepdale:

Partridge, Pheasant, Lapwing, Woodpigeon, Swift, Skylark, Swallow, Carrion Crow, Rook, Jackdaw, Magpie, Great Tit (one pair), Blue Tit, Willow Tit, Longtailed Tit, Treecreeper, Wren, Song Thrush, Mistle Thrush, Blackbird, Redstart, Robin, Blackcap, Willow Warbler, Dunnock, Meadow Pipit, Pied Wagtail, Starling, Greenfinch, Goldfinch, Linnet, Lesser Redpoll, Bullfinch, Chaffinch, Yellowhammer, Reed Bunting, House Sparrow and Tree Sparrow.

Nests found included Chaffinch, Reed Bunting, Willow Warbler and Yellowhammer.

Additional birds seen in the vicinity of Leavening were: Kestrel, Turtle Dove, House Martin and Collared Dove.

Birds reported as having been seen on the previous two days included Green Woodpecker, Tawny Owl's nest with eggs, Corn Bunting and Goldcrest.

Mammals and other veterbrates

Various members reported seeing the following during the weekend: Rabbit (plentiful), Water Voles (Burythorpe stream), Badger set (Mount Freeant), Fox, Brown Hare and Stoat.

Frogs and Toads were seen on all three days.

Insects (J. H. Flint)

A brisk, cool wind inhibited collecting on Saturday at Leavening but the other days were fine and the hot sunshine at Acklam Ings on Monday was ideal. Many insects were noted but almost all were common and widely distributed species. It was pleasing to see Orange Tip butterflies (*Euchloe cardamines* L.) and cardinal beetles (*Pyrochroa serraticornis* Scop.), but the marshy areas of Acklam Ings produced nothing of significance and although the chalk hillsides looked promising it was very difficult to find anything on them.

As sweeping the vegetation was not particularly productive an attempt was made to record as many gound beetles *(Carabidae)* as possible and 31 were noted. The ground beetles included *Notiophilus germinyi* Fauv., new to the vice-county, and *Leistus spinibarbis* F., the latter rarely seen in Yorkshire recently although it has been taken in all the vice-counties in the past. Both were taken at Acklam by Mr. Norris. The handsome, large crane-fly *Pedicia rivosa* L. was possibly the most notable insect found at Leavening.

Conchology (A. Norris)

The success of the meeting as far as the molluscan section was concerned revolved around the finding of the rather local snail *Vertigo substriata* (Jeff.). This snail, first recorded for the vice-county in 1974, proved to be very common in the small marshes formed as a result of the springs occurring all along this stretch of the Yorkshire Wolds.

RUNSWICK BAY, V.C.62 — JUNE 14th and 15th

Members representing twelve affiliated societies attended this two-day, week-end meeting. Mr. Atholl Wallis presided at the meeting for reports, on the Sunday, at the 'Square Rig' Restaurant, Runswick Bay. Mrs. Graham, of the Cleveland Naturalists, expressed thanks to Mr. Ian Lawrence the Divisional Secretary and organiser who acted as leader on both days.

Flowering Plants and Ferns (I. C. Lawrence)

Saturday was spent in the Hinderwell area. In the morning Port Mulgrave was visited. Along the roadside hedgebanks were stands of *Fumaria capreolata* (White Ramping Fumitory). The cliffs and shore of the old harbour proved interesting. Some fine clumps of *Lathyrus sylvestris* were noted along with *Vicia sylvatica* (Wood Vetch). *Anthyllis vulneraria* (Kidney Vetch), *Lathyrus montanus* (Bitter Vetch), *Melilotus altissima* (Tall Melilot) and *Lamium hybridum* (Cut-leaved Dead-nettle) were also noted. *Acer campestris* (Field Maple) was fairly frequent in the area.

The afternoon was spent exploring Borrowby Dale in the hinterland. This proved to be very hard going because of the almost impenetrable clumps of Hawthorn, Hazel, Oak etc. A fair list of the usual woodland species on a clay soil was made. These included *Campanula latifolia* (Giant Bellflower), *Hypericum hirsutum* (Hairy St. John's-wort) and *Orchis mascula* (Early Purple Orchis). In open spaces *Senecio erucifolius* (Hoary Ragwort), *Dactylorchis fuchsii* (Spotted Orchis), *Pulicaria dysenterica* (Common Fleabane), *Potentilla anglica* (Trailing Tormentil) and *Geum x intermedium* (Intermediate Avens) were amongst those noted.

On Sunday the party started at Runswick Bay, ascended the cliffs by the coastal path and followed the track along to Kettleness, returning to Runswick by the old railway track. At Runswick Bay *Rosa pimpinellifolia* (Burnet Rose), *Brassica nigra* (Black Mustard) and a good patch of *Catapodium rigidum* (Fern grass) were seen.

An interesting plant on the cliffs was a white-flowered form of *Vicia angustifolia* (Narrow-leaved Vetch). Also seen were several plants of *Ophioglossum vulgatum* (Adder's-tongue) on the cliff top along with *Listera ovata* (Common Twayblade). Both *Aira praecox* and *A. caryophyllea* (Early and Silver Hairgrass) were common along the railway track. At Kettleness several plants of *Artemisia absinthium* (Common Wormwood) were seen along with a good stand of *Vicia hirsuta* (Hairy Tare).

The weather remained fine for both days and good lists were made for the squares visited during the week-end.

Bryology (M. Dalby)

The dryness of the season made the collecting of bryophytes difficult and at Port Mulgrave the first day only common species were found, with the exception of a nice patch of *Cephalozia media* on the cliffs. On the Sunday Miss Robertson recorded *Sphagnum fimbriatum, S. plumulosum, Cratoneuron commutatum, Solenostoma sphaerocarpum* and *Calypogeia muellerana* from a spring at the southern end of the Bay.

HOOTON PAGNELL, V.C.63 — JUNE 28th

Sixteen societies were represented at this meeting in one of South Yorkshire's most delightful villages. The President, Mr. A. Brindle, spent the day with us in the field and chaired the meeting for reports after tea in the Hooton Pagnell Village Hall. Mr. K. Payne expressed a vote of thanks to Mrs. Freda Kemsley, the Divisional Secretary for V.C.63, for organising the day, and to Mrs. Grant Dalton, Major Warde-Aldam and the Coal Board, for permission to visit their properties.

Flowering Plants (W. A. Sledge and D. R. Grant)

All recording during the excursion was done in 44/40, a square which has received inadequate attention. Only 266 species are marked on the composite record card from which the entries in the *Atlas* are based. In the course of this excursion 40 additional records were made, all being widely distributed plants. Many common species are still unrecorded.

At Bilham quarry, where sandstone is exposed at the foot of the Lower Magnesian Limestone, relatively few limestone species were present. Plants seen here which were indicative of alkaline soil conditions included *Reseda luteola* (Weld), *Silene vulgaris* (Bladder Campion), *Inula conyza* (Ploughman's-spikenard), *Centaurium erythraea* (Centaury) and *Bromus erectus* (Upright Brome). *Carduus nutans* (Musk Thistle) and *Verbascum thapsus* (Great Mullein) were present and both *Bryonia dioica* and *Tamus communis* (White and Black Bryony) were in surrounding bushy ground.Several garden plants, no doubt tipped out in rubbish had become naturalised near the entrance to the quarry. These included *Polemonium caeruleum* (Jacob's Ladder — blue and white forms), *Solidago canadensis* (Golden Rod) and a white form of *Digitalis purpurea* (Foxglove). In the lower part of the quarry standing water is normally present as evidenced by the occurrence of *Typha latifolia* (Bulrush), *Eleocharis palustris* (Spike-rush) and *Juncus articulatus* (Jointed

Rush). A pool at one end of the quarry yielded *Potamogeton natans* (Broad-leaved Pondweed) and *Ranunculus aquaticus* (Water Buttercup).

At Hampole Wood and along the approaches thereto shrubs noted included *Euonymus europaeus* (Spindle Tree), *Cornus sanguinea* (Dogwood), *Rosa arvensis* (Field Rose), *Prunus spinosa* (Blackthorn), *Viburnum opulus* (Guelder-rose) and *Corylus avellana* (Hazel). The bridle path leading to the wood produced *Clinopodium vulgare* (Wild Basil), *Galium mollugo* (Great Hedge Bedstraw), *Ballota nigra* (Black Horehound) and *Brachypodium pinnatum* (Tor Grass). The wood itself yielded *Moehringia trinervia* (Three-nerved Sandwort), *Rubus caesius* (Dewberry), *Lysimachia nemorum* (Yellow Pimpernel). *Veronica montana* (Wood Speedwell), *Lamiastrum galeobdolon* (Yellow Archangel) and *Milium effusum* (Wood Millet).

The small lake at Frickley Hall provided the only habitat of botanical interest. *Nuphar lutea* (Yellow Water-lily), *Scrophularia aquatica* (Water Figwort), *Lycopus europaeus* (Gipsywort), *Iris pseudacorus* (Yellow Flag), *Potamogeton natans* (Broad-leaved Pondweed) and *Carex remota* (Remote Sedge) were seen here and elsewhere in the Hall grounds *Humulus lupulus* (Hop) and *Prunus avium* (Wild Cherry) were noted. Planted trees included *Acer platanoides* (Norway Maple) and *Quercus cerris* (Turkey Oak). Mr. Skidmore recorded *Genista tinctoria* (Dyer's Greenweed) as being present in quantity on a railway embankment north of the Hall.

Ornithology (J. D. Pickup)

There was little of ornithological interest at Bilham Quarry so Hampole Wood was visited where Tree Pipit, Spotted Flycatcher, Collared Dove, Turtle Dove, Woodpigeon, Blackcap, Willow Warbler and Goldcrest were identified. During the day several broods of juvenile Wrens were seen and a most encouraging sight was the large number of Whitethroats identified, several of which were feeding young. It was felt that Hampole Wood would repay more detailed ornithological investigation.

In the afternoon, Frickley Hall grounds were visited. Mrs. Payne watched a brood of Greater Spotted Woodpeckers. Excellent views of a Kingfisher were obtained on the park lake, where Moorhen, Coot and Little Grebe were nesting. The only Chiffchaff heard was in the park woodland.

43 species were identified during the excursion.

KETTLEWELL, V.C.64 — JULY 12th

About forty members attended this excursion, in glorious weather. The President Mr. A. Bridle, chaired the Meeting for reports after tea at the Fox and Hounds Inn, Starbotton. Mrs. J. Payne expressed a vote of thanks to the Divisional Secretary for V.C.64, Mr. John Hickson, who had planned and led the day, and to the landowners whose property we had visited.

Vascular Plants (J. R. Hickson and Mrs. J. E. Duncan)

By splitting into two main groups the botanists were able to cover much of the riverside and mixture of open and wooded slopes on the west side of the River Wharfe between Kettlewell and Buckden. A total of between 240-250 species were recorded during the day, the most outstanding discoveries being *Silaum silaus* (Pepper-saxifrage), *Crepis mollis* (Northern Hawk's-beard), *Rumex longifolius* (Northern Dock) and *Veronica catenata* (Pink Water-speedwell).

Several plants of *Trollius europaeus* (Globeflower) and a large patch of *Thelypteris phegopteris* (Beech Fern) were seen in Fosse Wood and a single plant of *Actaea spicata* (Baneberry) at the top of Lord's Wood. *Allium scorodoprasum* (Sand Leek) was in flower below Firth Wood and *Eleocharis austriaca* (Northern Spike-rush) was in distinctive condition at its first-recorded station near the river below Buckden. *Sedum album* (White Stonecrop) was seen in profusion along a stretch of wall overlooking the river just above Starbotton and

nearby in a quiet stretch of the river *Potamogeton natans* (Broad-leaved Pondweed) and *Elodea canadensis* (Canadian Waterweed) were seen, both also being noted lower down the river.

The most frequent orchid observed during the day was *Dactylorhiza fuchsii* (Common Spotted-orchid), other species being *Dactylorhiza purpurella* (Northern Marsh-orchid), *Gymnadenia conopsea* (Fragrant Orchid), including *var. densiflora, Platanthera bifolia* (Lesser-Butterfly-orchid) and *Listera ovata* (Common Twayblade). Sixteen species of *Carex* were noted, including *C. acuta, C. disticha, C. vesicaria* and *C. pallescens,* the last being particularly abundant on the steep grass slopes above Fosse Wood. Other species noted during the day included the following:

Asplenium viride
Barbarea vulgaris
Cardamine amara
Cirsium heterophyllum
Clinopodium vulgare
Crepis paludosa
Eleocharis quinqueflora
Equisetum fluviatile
Geranium sylvaticum
Helictotrichon pratense
H. pubescens
Koeleria cristata
Lysimachia nummularia
Mimulus guttatus
Minuartia verna
Ononis repens
Parnassia palustris
Polygonum amphibium
Primula farinosa
Rorippa sylvestris
Rosa villosa
Rubus saxatilis
Sagina nodosa
Salix pentandra
S. purpurea
Selaginella selaginoides
Sieglingia decumbens
Stachys palustris
Triglochin palustris
Viola lutea

Ornithology (J. D. Pickup)

The area covered included the western side of the river from Kettlewell to Buckden, and the eastern side of the river from Hubberholme to Yockenthwaite. In the afternoon one party explored the area east of Kettlewell up Park Rash. 52 species were recorded and these included the expected dales species such as Oystercatcher, Redshank, many Common Sandpipers, Red Grouse, Redstart, Ring Ouzel, Yellow and Pied Wagtail. Only one Grey Wagtail and one Wood Warbler were seen. Two broods of Nuthatches were seen in woodland on the western bank of the River Wharfe. There was evidence of breeding Redshank, Common Sandpiper, Lapwing, Whinchat, Redstart and Yellow Wagtail, Spotted Flycatcher and Willow Warbler. Kingfishers seen at Kettlewell and one at Starbotton are evidence of the recovery of this species in recent years. A list of all the birds seen has been sent to the vice-county ornithological recorder.

Lower Vertebrates (C. H. Pickup)

No intensive search for mammals was made during the day but a few casual observations are worthy of mention. Rabbits were apparently in decline in the area with only one dead animal and one young specimen sick with myxomatosis observed. Single specimens of hare and common shrew were reported. Badger sets were observed in the woodland on the western bank of the River Wharfe. Molehills indicated the abundance of this species.

The only non-mammalian vertebrates recorded were a toad and plentiful trout.

Insects (J. H. Flint)

A fine sunny day gave good collecting conditions although the wind was a little too strong. It was pleasing to see a strong contingent of entomologists and more orders of insects than usual received attention. Butterflies and moths were rather scarce but the Chimney Sweeper *(Odezia atrata* L.) was plentiful at between 1,000′ and 1,250′ on the hillside and the Muslin Footman *(Nudaria mundana* L.) was found in the valley. Beetles included *Cantharis paludosa* Fall. and *Dascillus cervinus* L., typical insects of these uplands.

The river provided most of interest. Ground beetles were not numerous among the shingle, and this is usually the case in limestone districts, but they included *Bembidion tibiale* Duft., *B. bruxellense* Wesm., *B. atrocoeruleum* Steph., and *B. prasinum* Duft. The handsome blue *Dianous coerulescens* Gyll. was found also. Bugs included *Saldula scotica* Curt. and *Cryptostemma alienum* H.-S. In the river itself the only water-beetles taken were *Platambus maculatus* L., *Latelmis volckmari* Pz., and *Limnebius truncatellus* Thunb., to which brief list my son Jeremy added *Orectochilus villosus* Muell., the river whirligig, noted two days previously.

It is particularly pleasing to have notes on caddis-flies from Mr. Brindle. He listed adults of *Athripsodes bilineatus* L., *A. commutens* Rostock, *Mystacides azurea* L., *Tinodes waeneri* L., *Psychomyia pusilla* F. and *Stenophylax lateralis* Steph. and the larvae of *Lepidostoma hirtum* F. from the river. Other larvae from the river included those of *Atherix ibis* F. and *Taphrophila vitripennis* Mg. (Diptera) and *Isoperla grammatica* Poda (Plecoptera). The bibionid fly *Dilophus humeralis* Zett. was common beside the river.

Dr. Pickup, ranging rather further afield, reported the moorland dragonfly *Cordulegaster boltonii* Don. from Hubberholme and Park Rash.

Other Invertebrate Orders (D. T. Richardson)

The following species were recorded from the pastures and woodlands between Kettlewell and Starbotton.

HARVEST SPIDERS

Mitopus morio (Fabricius), under logs; *Nemastoma bimaculatum* (Fabricius), under stones and logs; *Oligolophus tridens* (C. L. Koch), under logs.

WOODLICE

Androniscus dentiger Verhoeff; *Oniscus asellus* Linnaeus; *Porcellio scaber* Latreille; *Trichoniscus pusillus* agg. (Brandt); under logs and stones.

CENTIPEDES

Lamyctes fulvicornis Meinert; *Lithobius crassipes* L. Koch; *Lithobius forficatus* (Linnaeus); *Lithobius variegatus* Leach; under stones and logs.

MILLIPEDES

Cylindroiulus (Aneuloboiulus) punctatus (Leach), under stones, logs; *Glomeris (Eurypleuroglomeris) marginata* (Villers), under stones; *Isobates (Isobates) varicornis* (C. L. Koch), under bark of dead trees; *Ommatoiulus sabulosus* (Latzel), under stones; *Ophyiulus pilosus* (Newport), under stones; *Polydesmus angustus* Latzel, under stones, logs; *Polydesmus denticulatus* C. L. Koch, under logs; *Proteroiulus fuscus* (Am Stein), under bark of rotting logs; *Tachypodoiulus niger* (Leach), under stones and logs.

Mr. Norris reported 32 species of mollusca seen in the course of the day.

GOD'S BRIDGE, BOWES, V.C.65 — JULY 26th

Eighteen members went up to the northern border of the county to visit the upland Pennine River Greta where it cuts through limestone to form a natural bridge over the stream. Once again we enjoyed excellent weather. The time was spent examining the river and its banks and the adjacent disused railway line, some members then climbing to the peaty moorlands above the valley.

The President, Mr. A. Brindle, took the chair at the meeting for Reports in the Village Hall, Bowes, at the end of the day. Miss Kordik of the York Naturalists' Society, expressed a vote of thanks to Mrs. Jean Holloway, the Divisional Secretary for V.C.65, who had led and organised the proceedings and to the landowners.

Flowering Plants (T. F. Medd)

The area from the road to the River Greta was searched, but it was dry and although limestone was present, the absence of flushes makes the list not as interestint as it might otherwise have been. Species recorded include *Cerastium glomeratum** (Sticky Mouse-ear),

Myosotis secunda (Creeping Water Forget-me-not), *Montia fontana* s.s. (Blinks), *Ranunculus hederaceus** (Ivy-leaved Water Crowfoot), *Sieglingia decumbens* (Heath Grass), *Glyceria declinata* (Small Sweet-grass), *Cystopteris fragilis* (Brittle Bladder-fern), *Saxifraga tridactylites* (Rue-leaved Saxifrage), *Asplenium trichomanes** (Maidenhair Spleenwort), *A. ruta-muraria** (Wall Rue), *Arabis hirsuta** (Hairy Rock-cress), *Chenopodium bonus-henricus* (Good King Henry) and *Rumex longifolius* (Northern Dock).

The old railway track produced *Sagina nodosa* (Knotted Pearlwort), *Arabidopsis thaliana** (Thale Cress) and *Geranium sylvaticum* (Wood Cranesbill). The higher land very quickly became acid moorland, with such common species as *Vaccinium myrtillus* (Bilberry), *Empetrum nigrum* (Crowberry), *Eriophorum vaginatum* (Cotton-grass) and *Nardus stricta* (Mat-grass) and also *Viola lutea* (Mountain Pansy).

All the records are for 10 Km square NY/91 and those marked * are not in the B.S.B.I. Atlas.

Bryology (M. Dalby)

Campylopus introflexus, new to V.C.65, was found on the old railway line by Miss Robertson. This species was first found in Yorkshire in 1962 by Mr. Branson in Nidderdale, V.C.64 and has since been found in V.C.'s 63 and 62. It appears to be spreading throughout the British Isles. Other species found at this meeting included *Gymnostomum recurvirostrum, Leskea polycarpa, Neckera crispa* and *Tortula subulata.*

Plant Galls (T. F. Medd)

Diptera were represented by *Dasyneura urticae* (Perris) on *Urtica dioica* and *Geocrypta gallii* H. Low on *Galium verum. Diplolepis eglanteriae* Hartig on *Rosa* sp. is caused by a gall-wasp, whilst *Psyllopsis fraxini* L. on *Fraxinus excelsior* is the result of an homopteran (Jumping Plant-louse). Two gall-mites were encountered: *Eriophyes similis* Nalepa on *Prunus spinosa* and an unnamed one on *Sorbus aucuparia.*

Ornithology (G. Alderson)

The area visited was the River Greta, three miles west of Bowes, the adjoining moorland and the disused railway track. The species seen were what one would expect: Kestrel, Short Eared Owl, Red Grouse, Curlew and Golden Plover.

The environs of the river and of the railway held the greatest variety: Carrion Crow, Rook, Jackdaw, Lesser Black-backed Gull, Common and Black-headed Gulls, Lapwing, Oyster Catcher, Redshank, Snipe, Mallard, Teal, Heron and Sandpiper. Oyster Catchers appeared to have bred along the open and stonier stretches of the river, about three miles west of Bowes and, judging by their anxiety, had young in the vicinity.

Those with young included: Dipper, Starling, Thrush, Mistlethrush, Blackbird, Wood Pigeon (a nest with two squabs, three feet above ground, on the railway side), Pied, Yellow and Grey Wagtails, Swallow, Sand Martin, Redpoll, Spotted Flycatcher, Skylark, Meadow Pipit, Linnet, Tree Sparrow, Reed Bunting, Chaffinch, Willow Warbler, Goldfinch, Wren, and Wheatear.

In all, forty-two species were present: a good variety, considering that there was no real woodland.

Insects (J. H. Flint)

A cool day and a strong wind but once again an effective little party of entomologists present. Sweeping the vegetation was not particularly productive of anything but the common species and some effort was directed to the ground fauna which was not rich in species. Only 18 ground beetles (Carabidae) were noted, all of them the common species of the area. Typical riverside beetles, *Nebria gyllenhali* Schön., *Bembidion tibiale* Duft., *B. atrocoeruleum* Steph. were among the shingle and colonies of the rove-beetles *Bledius pallipes* Grav. were noted in the vertical river banks. Bugs included *Saldula scotica* Curt. and *S. c-album* Fied. The little water-beetles *Oreodytes rivalis* Gyll. and *Hydroporus pubescens* Gyll. were in pools in the river bed but the general paucity of insects, both on the banks and in the water, may

have been due to the scouring effect of flood water on the largely smooth limestone of the river bed.

Mr. Brindle contributes a useful but short list of aquatic insects from the river. He noted (Plecoptera) *Leuctra fusca* L. larvae and adults, *Dinocras cephalotes* Curt. larvae, *Isoperla grammatica* Poda larvae, (Ephemeroptera) *Ephemerella ignita* Poda larvae, (Trichoptera) *Rhyacophila dorsalis* Curt., *Hydropsyche instabilis* Curt. and *Polycentropus flavomaculatus* Pict., all larvae and adults, *Tinodes waeneri* L. adults and (Diptera) *Limonia didyma* Mg.

Mr. Norris reported 19 species of mollusca, all of them common and widely distributed species.

FIELD NOTES

Bembidion humerale **Sturm in Yorkshire, a beetle new to Britain**

On 17th August 1975 whilst taking part in the current Invertebrate Survey of Thorne Moors near Doncaster, sponsored by the Nature Conservancy Council, we collected a number of ground beetles from the dried-out, muddy edge of a pond in the Will Pits area. On subsequent examination of the material it was discovered that we had each obtained single specimens of a small *Bembidion* which we could not identify. Accordingly, both specimens were submitted to Mr. J. H. Flint for examination and he identified them as *B. humerale* Sturm, a species hitherto unrecorded in Britain. Later, A.N. sent his specimen to Professor Carl H. Lindroth of the Zoological Institute, Lund, Sweden, who kindly confirmed Mr. Flint's identification.

On 20th September 1975 Mrs. Lloyd Evans found a further specimen and handed it to R.C., whilst later on the same day A.N. discovered another. Both beetles were found in the north-east sector of the Moors amongst fairly recently worked bare peat, close to drainage channels. In the case of the second specimen the peat was being colonised by scattered grasses and *Eriophorum* sp. and the beetle was taken amongst matted algae, together with numerous specimens of *Dyschirius globosus* Herbst.

Finally, on 7th October 1975, we were collecting on bare damp peat, similar to the habitat of the second specimen of the 20th September, except for an absence of algae, and again in proximity to a drainage channel, but on this occasion towards the centre of the Moors. Here we discovered numerous specimens of *B. humerale*, together with *B. lampros* Herbst, *B. bruxellense* Wesm., *Notiophilus palustris* Duft., and *Dyschirius globosus* Herbst. A small series was gathered by both of us and specimens have been distributed to several private collectors and museums, including the British Museum (Nat. Hist.).

Bembidion humerale is a tiny carabid, measuring about 3.0mm. and it is very similar to *B. quadrimaculatum* L., but lacking the two light spots at apex of the elytra, and possessing completely black antennae. Professor Lindroth points out *(in litt.)*, that *B. humerale* differs from the dark form of *B. quadrimaculatum* (with the same elytral pattern), in the following points:

(a) metallic lustre of forebody very faint
(b) femora and tarsi much darker than tibiae
(c) frontal furrows less converging
(d) sides of pronotum more rounded.

Fuller details of the occurrence of this species at Thorne Moors, together with an appropriate amendment to the key provided in Professor Lindroth's recent *Handbook for the Identification of British Insects*, **4** (2): 49 (1974), will appear elsewhere *(Entomologist's mon. Mag.* in press).

Our thanks are due to Mr. Flint for much helpful advice and to Professor Lindroth for kindly confirming the identification.

Roy Crossley and Adrian Norris

A Contribution to the Orthopteran Fauna of Thorne Moor

W. D. Hinks, in the Y.N.U. Annual Report for 1953 (*The Naturalist*, 1954, 10-11), reviewed the Yorkshire records of the Bog Bush-cricket *Metrioptera brachyptera* (Linnaeus) and he wrote ". . . The headquarters of this species in Yorkshire is at Thorne where Dale took it as long ago as 1837. Porritt took it there towards the end of the last century and Bunting has collected it quite commonly in recent years. . . ." Thorne Moor is still the headquarters of the species in the county and since no recent work has appeared in *The Naturalist* regarding this and related species, I submit this field note regarding the Orthoptera of Thorne Moor.

The long, hot summer of 1975 was an excellent opportunity to locate the Bog Bush-cricket. On 19th July a nymph in its last instar was found at approximately grid reference 711172 in a damp situation dominated by *Calluna vulgaris, Erica tetralix* and small *Betula* saplings; an area just next to the old, deep peat-cuttings north-east of Durham's Warping Drain. Two males were subsequently heard singing in this locality on 8th August. On 2nd August along an overgrown mineral railway raised above the peat at approximately grid reference 729158 between Mill Drain and Cottage Dike within a space of 60 yards, 12 males were heard singing. Two males taken were both of the green variety. The track was surrounded by old, overgrown peat-cuttings comprising boggy ditches and parallel banks of relatively uncut peat, the latter mainly covered by *Pteridium aquilinum*, *Calluna* and *Betula*. The track itself was grassy but with some *Pteridium*, *Calluna* and *Betula*, plus *Chamaenerion angustifolium*. Some areas of the track were almost bare peat due to past burning and were being colonised by *Calluna*. The bush-crickets tended to sing from the densest available vegetation. The song, reminiscent of a loud, fast-ticking watch with the ticking slightly slurred, is easily missed, especially amongst the insect hum of a hot August afternoon. On 21st September two males were still singing in this locality.

On 8th August with Colin Wall, I counted another colony of bush-crickets along a stretch of another old mineral line leading from the Shoulder O' Mutton Well area for about 500 yards towards the line linking Rawcliffe Moors and the so called Paraffin Works. The slightly raised line was dry and overgrown with *Pteridium*, as well as grasses and other plants including *Calluna*. The moor on either side of the track was boggy but with some slightly drier areas and the dominant plants were *Juncus effusus*, *Betula* saplings, *Calluna, Erica* and grasses especially *Molinia caerulea*. Much of the area again comprised overgrown peat-cuttings with boggy ditches and drier banks. In this area a total of about 30 male bush-crickets were seen or heard, both along the track and on the adjacent moor and a female was captured. Many of the specimens were on *Molinia*. On the same date several males were also heard, again along a mineral railway, at grid reference 732143, between Angle Drain and Thousand Acre Drain.

From 1973 to 1975 only two other Orthopteran species have been located on Thorne Moor; the Common Groundhopper *Tetrix undulata* (Sowerby) has been located by myself and Colin Wall in two areas (although it is easily overlooked); first along the path running from grid reference 718158 to 728156 on 11th September 1973 and 11th July 1975, both singles; four were located on an adjacent dry peat bank on 13th April 1975, all four being on bare peat between *Pteridium* plants. Secondly a specimen was found on *Sphagnum* on 29th September 1974 south of the mineral line running ESE from the site of Elmhirst Cottage at approximately grid reference 725140. The Common Field Grasshopper *Chorthippus brunneus* (Thunberg) has also been noted along mineral railway lines and is common on peripheral areas off the peat, as for example on the spoil from Thorne Colliery.

Martin Limbert

A Rare *Philonotis* in Teesdale

I have received a *Philonotis* specimen from Miss M. Dalby, which was collected by the Rev. G. G. Graham from wet soil and rocks near the river Tees at High Force Teesdale, V.C. 65 (Grid Ref: 35/882284) on the 29th October 1968. This specimen is *Philonotis capillaris* Lindt. and it makes an interesting addition to the list of Teesdale rarities.

J. H. Field

Roesel's Bush-cricket in the Spurn area

In the Y.N.U. annual report for 1948 (*Naturalist*, 1949: 31), it was stated that W. D. Hincks had located one nymph of Roesel's Bush-cricket *Metrioptera roeselii* (Hagenbach) in the Long Bank Dyke, Kilnsea in June 1947. In 1948 he visited the dyke in July and there were a few nymphs of *M. roeselii* in the same place, though he did not locate the species in September of that year. In Hincks' section on Orthoptera in the study of the entomology of Spurn (*Naturalist*, 1951: 142), it is stated that *M. roeselii* was still found sparingly along Long Bank Dyke and was also located at Skefling, a few miles further along the estuary. Little was then heard of it in Yorkshire until E. C. M. Haes' field-note in a recent issue of the *Naturalist* (1975: 28); regarding the Orthopteran fauna of the Spurn area he stated that in July 1974 he located a nymph of the bush-cricket at the north end of the newly enlarged lagoon on the coast south-east of Easington, a locality close to Hincks' site along Long Bank Dyke.

It may be of interest therefore to record that on 23rd October 1975 I located eight singing males along Beacon Lane, a track running NNW from the Bluebell shop and past the caravan site at Kilnsea. The lane was bounded by stubble fields, and a hawthorn hedge lay on either side of it, and between these and the track itself were grassy borders, with some bramble. It was from this long, coarse grass that the bush-crickets sang, except for one which sang from grass, mainly reed *Phragmites communis*, just beyond the northern end of the track.

Martin Limbert

Blaniulid Millipede new to Mid-West Yorkshire

Amongst collections of millipedes which I made from beneath the bark of old logs in Grass Wood, Grassington (34/988652), 28/10/73; Bolton Abbey Woods (44/080548), 21/9/74 and woods near Moor End, Kettlewell (34/956731), 12/7/75 were specimens of *Isobates varicornis* (C. L. Koch).

The Grass Wood specimens were found in association with *Cylindroiulus (Aneuloboiulus) punctatus* (Leach) and the Bolton Abbey and Kettlewell specimens with both the latter species and *Proteroiulus fuscus* (Am Stein).

Isobates varicornis is a small, cylindrical, light to dark brown millipede, length 4-13mm, breadth 0.3-0.5mm. Contents of repugnatorial glands very dark brown; ocelli 20-25 arranged in a characteristic triangular group, a feature which readily distinguishes it from *Proteroiulus fuscus*.

I am indebted to Dr. J. Gordon Blower, University of Manchester and Dr. C. Fairhurst, University of Salford for confirming the identity of the specimens and pointing out that the finds constitute a new vice-county record.

Douglas T. Richardson

Rapid Metamorphosis of Poplar Hawk Moth

A wild-caught, wild-mated female Poplar Hawk Moth *(Laothoe populi)* from Kimberworth, Rotherham, began laying ova on 17th July 1975. The first larvae hatched on 20th July and a few of them were reared by the writer. Pupae began to form on 7th August and 17 larvae had pupated by the 23rd, when the remainder were passed to a young naturalist. Two of the moths emerged from the pupae on 8th September and a further one, from the group which were given away, emerged on the 29th.

The weather this year has been atypical and has affected the appearance of several species. Have any other examples of precocious emergence of hawk moths been noted in the north?

W. A. Ely

BOOK REVIEWS

Animal Population Ecology by **J. P. Dempster.** Pp. x + 155 with 50 text figures and 24 tables. Academic Press, 1975. £3.80.

This is a textbook clearly designed for a University student. It comprises a brief survey of the data required for the construction of a realistic and useful life table, very brief surveys indeed of intra- and inter-specific interactions along with genetic change and social behaviour, and a more extended treatment of selected field population studies taken from the literature. The last two chapters deal with population theories and with applications of population ecology.

Perhaps the greatest merit of this book is to be found in the series of concise summaries of the selected field studies. Its greatest defect is in the author's failure to realise that an adequate understanding of the very complex and continuously perturbed field population systems can be achieved only by the continuous development of hypotheses and of *a priori* models, tested initially under controlled conditions in the laboratory along with a progressive utilization of these laboratory models in field studies. An adequate field study of any insect population for instance can be made only by the use of predator-prey and host-parasitoid theory which has developed so rapidly and progressively over the past decade. There is no reference to these vitally important advances in this book, not even in chapter 6 which is entitled "Natural Enemies".

E.B.

Marine Ecology & Fisheries by **D. H. Cushing**. Pp. xiv + 278 with 68 text figures. Cambridge University Press, 1975. £9.00 hardback: £3.90 paperback.

The Productivity of the Sea by **D. H. Cushing.** Oxford Biology Readers, No. 78. Ed. J. J. Head. Oxford University Press, 1975. 30p.

The life-giving Sea by **D. Bellamy**. Pp. 320 with over 250 illustrations in colour and black and white. Hamish Hamilton, 1975. £5.75.

Terrestrial ecology for many years has had a strong theoretical component. Marine ecology, however, has remained largely descriptive. The appearance in 1974 of Steele's *The structure of marine ecosystems*, comparing and contrasting marine with terrestrial ecosystems was an important milestone in marine ecology. D. H. Cushing's *Marine Ecology and Fisheries* is likely to be regarded similarly. Whereas Steele's book was largely theoretical and based on computer simulations, Cushing's book provides a wealth of detail on production and nutrient cycles, models of production, population dynamics of fish and the influence of climatic changes on populations. The chapters on production and the development of models of fish population I found particularly interesting. The latter chapter gives a lucid account of the development of the Beverton & Holt analytical model and the more recent trends such as cohort analysis. Surprisingly, the treatment of food webs covers a mere 15 pages of the total 278, yet it is likely that intense competition and predation on fish larvae occur in the plankton and dramatically affect recruitment, and such factors are very poorly understood. It is also doubtful, as is stated, that diverse species assemblages are always more stable than less diverse communities. May has recently shown, using mathematical models, that simple multi-species models are less stable than simple few-species models. Cushing also suggests that it is easier to study ecological processes in the sea than on land, which would be disputed by many marine biologists. These however are small criticisms when one considers the wide range of topics covered and the skilfull treatment by the author of complex topics such as mathematical models of fish populations. I can strongly recommend this book to marine ecologists and am sure that it will provide a sound base for many marine ecology courses.

It is significant that both Steele and Cushing are primarily fisheries biologists and not academics. Whereas the fisheries biologists work on a wealth of data obtained by many people over many years, the academic has to obtain his own data. However, the fisheries

biologist, as Cushing points out, has studied single species in isolation and it is the biological interactions long-studied by academics, that are likely to add the next chapter of our understanding of marine ecology.

Cushing's second book *The Productivity of the Sea* can be strongly recommended to schools. It covers the main types of plants and animals found in the sea with a first-class simplified account of production and its relation to fisheries.

David Bellamy's *The Life-giving Sea* is written for a lay audience in the author's inimitable and dynamic style, and is based on his experiences of the sea in many parts of the world. The book is well illustrated with 20 colour plates and hundreds of black and white pictures. Unlike most popular accounts of marine biology Bellamy's delves into the anatomical details of the animals and plants. It would be churlish to quibble over details in a book written with such enthusiasm, but I was disappointed to see the appearance of data on effects of pollution on kelp holdfasts which have been shown to be erroneous. This apart the book is likely to have a wide appeal to schoolchildren, enthusiastic amateur naturalists and particularly to divers. The text is always lively and the illustrations are well chosen and of good quality. The book is in keeping with Bellamy's image as a superb popularizer of science.

J.S.G.

The Seas by **F. S. Russell** and **C. M. Yonge**. 4th edition. Pp. x + 283 with 48 plates, 24 in colour and numerous text drawings. Frederick Warne. £6.95.

This "introduction to the study of life in the sea" by two internationally famous marine biologists was first published in 1928. Few branches of science have advanced more rapidly over the years since *The Seas* first appeared and this largely rewritten edition has been expanded and thoroughly revised throughout to cover increased knowledge. It has also been reset in a larger format and the illustrations have been much improved. The original plan has been retained (and it is difficult to see how it could have been improved) with two new chapters added; one on sensory perception in some marine animals and the other on the influence of man on marine life.

The Seas has become a classic in its authors' own lifetime. Despite the publication of many other works on oceanography and marine science it retains all its original freshness and fascination and in its new, handsomely produced form it is likely to retain its preeminence for many years to come.

W.A.S.

Finches and other seeding-eating birds by **Robin L. Restall**. Pp. 333 with sixteen photographs and 93 line drawings. Faber and Faber. £7.00.

The sub-title "An aviculturalists guide to the seed-eating birds of the world", is more informative of the scope of this book, which is an attempt to put into scientific order the knowledge about these groups of birds. The author selects those birds which are known in aviculture in any part of the world which belong to the four families of seed-eating birds; Emberizidae (buntings and cardinals), Fringillidae (true finches), Estrildidae (waxbills, munias, grass-finches and parrot-finches) and Ploceidae (weavers, whydahs and sparrows), discussing a total of about 350 species. Each section begins with avicultural information and is followed by a list of selected species comprising a description, distributional data and specific avicultural comment.

For the aviculturalist this is obviously a much-needed book for scientific information and breeding reference, bringing order into common-name chaos. The line drawings are delightful and informative.

I.W.

Birds of Town and Suburb by **Eric Simms**. Pp. 248 with 14 text figures and 60 photographs. Collins 1975. £3.50.

If I had a criticism to make of this latest Eric Simms volume, it would be that its title does not sufficiently convey its real scope. It deals mainly, though not exclusively, with the London area and because of this has a certain bias which may mislead uninformed readers from other parts of the country. This is perhaps not so much the fault of the author as a pointer to the comparative lack of intensive local census work on common species by many of our naturalists' societies. The book suggests innumerable ideas for individual and corporate studies which can be undertaken in built-up areas.

The author does not confine himself within limits which one might expect from the title. Whilst airfields, gravel-pits and reservoirs may be concomitant with increasing urbanisation, it comes as something of a surprise to read of birds at airfields in Wilts. and Lincolnshire, at Chew Valley Reservoir in Somerset or Abberton near the Essex coast. Some of the material may appear extraneous to the subject in hand, e.g. "A Snowy Owl and a Gyr Falcon were shot in Anglesey in the same year". There are references to Cirl Buntings in the Chilterns, Dartford Warblers on southern heathland, and to the tameness of Chaffinches and tits in the Lake District and Wester Ross. Nevertheless these many snippets of information make for livelier reading.

In addition to dealing with birds found in the concentric rings from inner to outer suburbs and to the edge of the countryside, there are major sections on roosting habits and flyways, and on bird migration as it may be witnessed by the townsman.

There is a wealth of factual information from the author's own observations and those of other workers and of quotations from other authors with a 15-page supporting bibliography. Eight appendices list birds seen at various London sites.

A very readable and worthwhile book.

R.F.D.

American Seashells by **R. Tucker Abbott.** Second edition. Pp. 663 with 24 colour plates and over 400 black and white illustrations. Van Nostrand Reinhold Co. $49.50.

With the resources of dry land dwindling at an alarming rate attention is switching to the seas so the publication of this fine book which deals for the first time with every mollusc known to be living in the waters around North America could hardly be more timely. The first edition of *American Seashells* was published in 1954 and this second edition is a far more complete and comprehensive work. To some extent the title is misleading in its modesty: far from being confined to shell-bearing molluscs this book also covers the shell-less sea slugs and octopods. About 2000 species are described in detail and another 4500 are listed with full citations and localities. The colour plates are superb and over 4000 carefully chosen black and white photographs and line drawings show diagnostic characters. The photographs of the Chitons in particular are masterpieces of skilled lighting.

Keys are used sparingly and are refreshingly simple. The accounts of species are models of concision giving full details of diagnostic characters, synonomy, geographic range, ecology including depth of normal habitat and references to recent literature. Over 14,000 items are indexed including all the synonyms. Useful information for the conchologist printed on both end-papers includes conversion scales to the metric system; these are indeed helpful since recently described species tend to be measured in millimetres whilst older descriptions use fractions of an inch. A brave attempt has been made to standardize the popular names. Often this involves direct translation from the Latin; occasionally the translation is rather too direct — Coronate Doto for *Doto coronata* is somewhat less evocative than the Crowned Sea-nymph of Edward Step's "Shell Life".

Whilst preserving throughout the highest scientific standards the author constantly bears in mind the needs and interests of the amateur collector; pitfalls in identification are carefully sign-posted and habitats are described in sufficient detail. Nor is the need for conservation forgotton: of *Cyphoma gibbosum*, the Flamingo Tongue . . "Fairly common on

searod gorgonians below low water from 3 to 30 feet. Please do not overcollect this species. It is becoming seriously depopulated everywhere". The dry subject of changes in nomenclature is enlivened by the information that the original name *Jumala* Friele, 1882 of the genus *Beringius* Dall, 1886 was rejected by the International Commission ". . . on the quaint grounds that it was blasphemous". The ignorant foreigner may be glad to learn that the Geoduck, *Panopea generosa*, is pronounced Goo-ee-duck.

Using the excellent index it was easy to discover that 119 genera of marine molluscs on the British list, over 60% of the total, are represented in North America, often by the same species, proving how relevant this work is to our own studies. As for the price, the poor should insist that this book be made available at their libraries; the wealthy should realize that it is a far more rewarding and probably a safer investment than Kruger-rands.

L. Ll-E.

Grzimek's Animal Life Encyclopedia Vol. II: Mammals 2. Pp. 636 with 89 colour plates. Van Nostrand Reinhold Co. 1975. £12.

The second volume devoted to Mammals in this Encyclopedia opens with chapters on chimpanzees and on mankind and his origins. Facts about distribution and form are here enlivened by much information on behaviour and its biological basis. The pure zoologist shares the field with anthropologist, sociologist, psychologist and ethologist. The matter of intelligence and behavioural studies recurs in the final chapters which deal with whales and their allies and which include a section devoted to recent studies of dolphins and their remarkable capacity for learning.

Half of this volume is devoted to the numerous families of Rodents, the other chapters covering flying lemurs, insectivorous and Old World fruit bats, armadillos, sloths, anteaters and pangolins. In addition to the basic facts concerning distinguishing characteristics and distribution, much information is given on habits and social life of the species, often including the contributor's own first-hand observations. One can learn of the feeding habits of vampires, echo-location of bats, the mass migration of lemmings, the social life of porcupines, the astonishing lethargy of sloths or the biology of whales, to mention but a few of the better known animals; and the information is equally full for a host of less familiar creatures. The fine colour plates and the marginal sketches and distribution maps give added pleasure to a text which throughout is as readable as it is informative.

Lichen Flora of the West Yorkshire Conurbation by **M. R. D. Seaward.** Proc. Leeds Phil. and Lit. Soc., Sci. Sect. **10**, Pt. 9, pp. 141-208. £2.40 post free from The Secretary, Leeds Phil. and Lit. Soc., Central Museum, Calverley Street, Leeds 1.

A concern for the quality of the environment is one of the more welcome trends in present day thinking. As biological indicators of atmospheric pollution the environmentalist has no better material wherewith to assess the status of the environment and level of pollution than the lichens. Dr. Seaward's study of the lichen flora of the area within 30km. of the centres of Leeds and Bradford is primarily directed at examining the problem of habitat contamination as indicated by the species which occur. Accounts of the history of lichenological work in the Riding, the topography, climate and technological pressures responsible for pollution and their amelioration in recent years, precede the main section in which the present distribution and ecological characteristics affecting the distribution patterns of corticolous, saxicolous and terricolous species are examined in detail. The paper concludes with a revised flora of the area in which 286 lichen taxa are listed; 140 of these were recorded during the survey and at least 35 species known to have occurred previously are now extinct.

This is a notable contribution both to regional lichenology and to environmental studies.

W.A.S.

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A Quarterly Journal of Natural History for the North of England

Edited by M. R. D. SEAWARD, M.Sc., Ph.D., F.L.S., The University, Bradford

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THE YORKSHIRE NATURALISTS' UNION

THE NATURALISTS' YORKSHIRE

Compiled by members of the Yorkshire Naturalists' Union and edited by W. A. Sledge. Pp. 96 with 15 photographic illustrations. Dalesman Publishing Co. Ltd. Obtainable from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 60p plus 13½p postage.

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 50p plus 9p postage.

Also "The Macro-lepidoptera of Spurn Head, E. Yorkshire" by S. L. Sutton and B. R. Spence (ex *The Naturalist*, 1974); price 25p plus 6½p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

1976 CHISLETT MEMORIAL LECTURE

The 12th and final Chislett Memorial Lecture will be given in Granby High School, Harrogate, at 6.30 on Saturday, 13th March, 1976.

Granby High School is in Claro Road, which is off the A59, York to Skipton road near Granby corner on the north-east side of Harrogate. Turn off at the County Hotel.

The speaker will be Mr. E. E. (Ted) Jackson, formerly of Masham, who during his ten years as Chief Education Officer to the Wildfowl Trust led an expedition to Spitsbergen in 1973. This will form the basis of his lecture, *North of the Desolate Sea.*

This is a free and open meeting. Please tell fellow naturalists about it.

REQUEST FOR INFORMATION — SWILLINGTON INGS

Mr. John Ward of 8 Gamble Hill Vale, Bramley, Leeds 13, is engaged on writing up the ornithology of Swillington Ings and would be glad to hear from anyone who worked the area in earlier years and who may have unpublished records.

Subscription rates: Issued free to individual members of the Yorkshire Naturalists' Union and to Affiliated Societies.

Institutions and Subscribers £6.00.

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THE NATURALIST

FOR 1976



Dr. W. Arthur Sledge
Editor of *The Naturalist*, 1943-1975

In 1943 Dr. W. Arthur Sledge became co-editor with Mr. W. R. Grist of *The Naturalist*, and in 1948 became its sole editor. Through his meticulous and scholarly editing of the many issues which followed he brought the journal to a high level of scientific and editorial excellence. His policies, which have helped to

stimulate substantial growth of the journal in terms of individual and institutional subscriptions, have played a large role in making *The Naturalist* into the highly regarded journal that it is today. It is perhaps fitting that the publication of the centenary volume, another milestone in the history of *The Naturalist*, should coincide with his retirement. The Yorkshire Naturalists' Union owes a large debt of gratitude to Dr. Sledge for his long and unstinting dedication to this journal.

The editor is aided in his task by numerous persons who kindly give specialist advice on manuscripts submitted for publication. These manuscripts vary in scope and I believe this has contributed greatly to the success of this journal. The policy of your new editor will be to fulfil the needs of both members and subscribers, and to this end it is hoped that a wide range of papers can be published which are of local and national importance. Each manuscript submitted will be judged not only on its intrinsic merits but also on the part it plays towards the production of a balanced publication. Annual reports will be included within *The Naturalist* and subjected to the same scrutiny as other manuscripts in the interests of financial economy. Recorders are asked to edit their contributions carefully, and to compress them into a concise account of such topics as county and vice-county additions, rarities, unusual ecological and geographical occurrences, and important seasonal variations. Furthermore, many components of annual reports would be more suitable if presented as shorter articles and field notes in *The Naturalist*, and more definitive and comprehensive accounts of fieldwork data, check-lists, etc. can be collated from recorders' files and presented for publication at wider intervals of time. Book reviews will remain an important feature of this journal, as will the annual index. It is to be hoped that now the centenary volume has been reached consideration will be given to the possible compilation of an index to cover the first hundred volumes of *The Naturalist* and the wealth of information contained therein.

I look forward to an interesting and fruitful term of office, and welcome the opportunity afforded for closer contact and exchange of ideas with members of what is, happily, one of the most thriving societies of its kind — an encouraging state of affairs which is due in no small measure to the devoted labours of my predecessor in this office.

M. R. D. SEAWARD

FIELD NOTE

Black Rat in Sheffield

In a recent interview, Mr. E. Bearder of the Environmental Health Department, Sheffield, remarked that he had encountered a Black Rat or Ship Rat *(Rattus rattus* (Linn)) in Sheffield, "some 15 years ago" (1960 approx.). A single specimen was found dead, after treatment with poison, in a warehouse at Canal Wharfe (map reference 43/362877), the Sheffield terminus of the South Yorkshire Canal.

At one time Mr. Bearder dealt with several thousand rats each year, but found a Black Rat only on this one occasion. He suggests that it arrived in Sheffield via a barge from an east coast port.

Derek Whiteley
Sheffield City Museums

THE DECLINE OF THE OTTER IN SOUTH YORKSHIRE AND ADJACENT AREAS

C. A. HOWES

Björn Kurten (35) wrote: "The otter represents the most elegant solution to the problem of constructing an amphibious carnivore that nature has so far effected." Certainly, until the introduction and spread of the American mink *Mustela vison* Sch., the otter was unrivalled in its ecological niche, the most closely related co-inhabitants of its geographical range offering little direct competition for food or habitat.

Corbet (15) demonstrates the success of the otter *Lutra lutra* L. by illustrating its vast post-glacial range, an area unique amongst non-synanthropic mammals, encompassing the entire palaearctic and a substantial proportion of the oriental region. This versatile species has succeeded in becoming established in the aquatic habitats of every climatic and vegetational zone from north Africa to the arctic tundra and from the west coast of Ireland east to to Japan, penetrating down to southern India, Sri Lanka and Java.

The otter made its first appearance in Europe during the Emian (Ipswichian) interglacial — about 100,000 years B.P. — becoming a fairly common feature of the late Pleistocene and Holocene faunas (35). In Britain, other remains have come from early Pleistocene deposits at Grays, Essex, from Holocene peats of Watcham Fen, Cambridgeshire and the Lincolnshire fens (40). In Yorkshire, archaeological investigations have revealed otter remains in a post-glacial bone accumulation at Carlton, Riccaldale (48) — near to sites interestingly known as Otter Hill and Otter Hill Common — from Iron Age lake-side sites at Thornton-le-Dale and Pickering (3 and 20), and from 14th century deposits in Frenchgate, Doncaster.

THE OTTER SURVEY

Today there are many reports of declining populations throughout the otter's range and concern has been voiced for the otter's future in Britain (14), where a history of direct persecution and latterly a variety of pressures on its habitat and way of life are said to have caused and maintained its decline.

During 1973 a joint Mammal Society and Nature Conservancy project was launched to investigate the distribution and population trends of the otter in Britain. The present study was carried out with a view to providing evidence for this project on the decline of the otter in South Yorkshire and adjacent areas of North Nottinghamshire and South Humberside, to identify the causes of the decline and propose conservation measures which may ensure the otter's survival in this region.

Methods

Historical records have been gathered from museum specimens, personal recollections, numerous literary and archival sources (see references) and these date back to the 14th century. The records have been used to plot past distribution and to indicate status, and when reviewed against a background of other historical and environmental developments have been used to demonstrate the nature and extent of population decline.

PRE-19th CENTURY DISTRIBUTION AND STATUS

Up till the mid-18th century, otters appear to have been present in every river system in South Yorkshire, South Humberside, North Nottinghamshire and North Derbyshire. Fish-ponds and ornamental lakes were also regularly visited. The population density of this largely solitary and nomadic mustelid seems to have been relatively high, the ratio of otters to the more easily caught weasels and polecats recorded in the Arksey churchwarden's accounts (for the seventeen years between 1720 and 1770 when otter bounties were paid out) being 1:8 and 1:5 respectively (2).

(i) Pennine Area

Its range included the fast-flowing Pennine headwaters of the Aire, Calder, Dearne, Don, Rother and the Derbyshire Derwent (6, 24, 34, 51).

(ii) South Yorkshire Coalfield

Across the Coal Measures it was abundant in the lush valleys of the Dove, Dearne, Don and Rother, now densely urbanised and heavily industrialised. Wilkinson (51) writes, "The district was a favourite retreat for the otter which abounded to a considerable extent." They were evidently regarded as a serious menace in the Tankersley, Woodkirk and Thornhill districts (51).

(iii) Don Valley

William Guest, a keen angler from Bentley recalled that during the 1790's he "frequently met with otters in the Don" (26), and certainly along the Don valley east of the Magnesian Limestone there are numerous records, well documented sites being Engine Wood, Sprotborough, the River Cheswold at Doncaster (now largely filled in or culverted), and Wheatley Park. The otter even influenced place names, the island in the Don at Sprotborough Falls being known locally as 'Otter Island'.

(iv) Humberhead Levels Area

Otters inhabited the lower Don and Trent, the Went, Torne and Idle which meandered out amongst the vast marshes, meres and fens of Hatfield Chase. Miller (41) noted that there were "many of these animals in the Idle between Bawtry and Stockwith" and that they also "frequented the Ryton between Blyth and Serlby." William Brook of Bawtry noted, "The river Torne at Acomb Bridge to Rossington Bridge offered much sport with the otter hunt . . . others were found in the Idle and Ryton down stream to Misson" (26).

A HISTORY OF PERSECUTION

(i) The Otter as a Pest Species

Fish featured significantly in the mediaeval game economy with most stately homes, estates and large ecclesiastical establishments having their own fish ponds, and an abundance of fish, including salmon, was harvested from numerous fish traps along South Yorkshire's once richly stocked rivers (12 and 33). Consequently the piscivorous otter was thought to be in direct competition with man for an important source of food. Following the usual pattern in such cases, a tradition of persecution evolved with the aim of controlling or eradicating the 'voracious menace'. Mediaeval public relations through fable and florid, courtly verse — based no doubt on hearsay and circumstantial evidence — branded the otter with an undesirable reputation for savagery, cunning, tenacity and greed. The following passage from William Somerville's four-book poem 'The Chase' published in 1735, eloquently moralizes on the destructive nature of the otter.

> "Where rages not oppression?
> Rapine and spoil haunt even the lowest deeps;
> Seas have their sharks.
> Rivers and ponds enclose the rav'nous pike;
> He in turn becomes a prey;
> On him th' amphibious otter feasts.
> Just is his fate deserved;
> But tyrants know no bounds;
> Nor spears that bristle on his back, defend the perch
> From his greedy jaws.
> Without remorse, this midnight pillager ranging around
> Insatiate swallows all."

In addition to its legendary predilection for fish, the otter was branded as a destroyer of beast and fowl, Carew, in his 'Survey of Cornwall' published in 1602 noting that otters "make bold now and then to visit land and break their fast upon the good man's lambs, or

the good wives' pultrie" (25). The Rev. E. Topsell in 1607, in his 'Historie of Foure-footed Beastes' asserted that the otter was "a very crafty and subtile beast", and Thomas Pennant wrote in 1768 "The whole appearance of the otter is something terrible" and that they are "most accomplished biters" (44).

Evidence of a campaign to rid an estate of an apparently thriving population is found in the following extract from a letter dated 8th November 1544 from Sir Henry Savile of Tankersley and Thornhill to his cousin of Plumpton. "The cause of my sending my servant at this time is this. He informs me that in your country there is a man that can kill otters very well; wherefore I send him to get him for a week. I assure you they do me exceeding much harm at divers places, especially at Woodkirk and Thornhill, and lye in small becks. My folk see them daily and I cannot kill them, my hounds be not used to them".

(ii) The Payment of Bounties

In 1566, in order to encourage the control of vermin, an "Acte for the preservation of Grayne" came into being enabling churchwardens and parish constables to offer bounties for the heads of animals classified as vermin (43). Under this category came urchants (hedgehogs), weevils (weasels), armyns (stoats), foulmarts (polecats), greys (badgers), foxez, wilde cattes and bowsons (otters). The bounties paid varied from parish to parish, being manipulated by the church wardens to reflect the supposed pest value of the various orders of vermin. The parishes of Arksey, Worksop, Worsbrough and Wortley paid one shilling per otter head and Doncaster in 1619 paid 6d., as compared with 2p. per weasel and 4d. per polecat. In the parish of Arksey the annual otter cull up till the late 1700's was about one per year, with five being the maximum. If this was representative of all river-side parishes in South Yorkshire the annual toll could have been in the order of 35-40.

(iii) Otter Hunting for Sport

Hatfield (26) inferred that otter hunting became something of a cult amongst the young noblemen of Elizabethan England, though there is little evidence of the sport ever achieving the popularity of deer or later fox hunting. However the sport, though without organized packs of hounds, was enthusiastically pursued as a rural pastime during the 18th and 19th centuries. The sporting image of the country gentleman became fashionable and consequently numerous accounts of otter kills were singled out for publication to highlight the skills and bravado of the huntsman and his hounds. Symptomatic of this sporting age was the proliferation of taxidermy practices, demand being sufficient to support no less than 28 in South Yorkshire during the 19th century. Hugh Reid (1783-1863) the famous naturalist and collector who established a thriving taxidermy business in Doncaster, attracted for preservation numerous sportsmen's trophies — a succession of the largest, most ferocious or the last otters — from many localities in South Yorkshire and adjacent areas. Unlike most of his profession, Reid kept records of his specimens, these being published by C. W. Hatfield (26).

Many of the farmers and 'vulgars' resident near the Don, Torne, Idle and Trent made regular excursions with spear and trained hounds. Renowned amongst these local otter hunters was Mr. Whitaker (c.1710-1794) and his young friend Robert Lee (c. 1755-1814) both of Auckley, Lee being described by Hatfield (26) as "one of the last of the race of otter hunters in South Yorkshire". Whitaker, perhaps the most notorious of his breed, was allegedly a master in the use of the otter spear, and delighted in recounting his otter hunting exploits. Hatfield relates "What miles Whitaker has traversed in pursuit of this fish destroyer! The banks of the Torne, Trent and Don were trodden again and again by his unwearied feet". He evidently played an important role in the destruction of otters which fished the ornamental lakes and ponds in the Doncaster area. "Every hall and mansion of consequence in the neighbourhood received him . . . the more he protected the 'Stew ponds', the more cordial were his receptions" (26).

(iv) Effect of Sporting Firearm Development

The invention about 1610 of the dog or English lock, a safety device on early firearms, stimulated the widespread use of guns for sporting purposes. During the second half of the 18th century there were many sophistications which greatly increased the handiness,

efficiency and effectiveness of hunting firearms. By the 1780's and 1790's the unwieldy, long-barrelled, unpredictable 'flash-in-the-pan' ironmongery had been superseded by shorter, double-barrelled, percussion-cap, muzzle-loading pieces.

The gathering popularity of these more effective hunting pieces rendered the otter increasingly vulnerable, the record of two being killed with one shot on the banks of the Don at Wheatley (26) typifying the situation. Jourdain (34) noted that otters had been "relentlessly shot" in the upper Dove of North Derbyshire and William Guest, referring to the Don around Doncaster noted that by about 1800 "the animal had become extinct by the vigilance of the expert gunner" (26).

(v) Demand for Otter Fur

A demand from the prestige clothing world for otter pelts provided the 'rustic' otter hunter with an added and certainly a more realistic incentive, effectively applying further pressure to the otter population. The ordinance of skinners in the York Civic Record, thought to refer to the late 15th century (10) valued otter pelts at the princely sum of three shillings each and during the mid-18th century, Mr. Whitaker of Auckley was alleged to have received up to one guinea per pelt (26).

ENVIRONMENTAL REPERCUSSIONS OF AN INCREASING HUMAN POPULATION

The massive acceleration in population growth in the industrial communities of the South Yorkshire coalfield and the Don valley brought about enormous pressures on the environment, leading to water pollution, habitat destruction and disturbance on a vast scale.

Up till the close of the 17th century, Doncaster and Barnsley were small market towns and Sheffield was little more than an accumulation of villages with a population of about five thousand. With the advent of the industrial revolution in South Yorkshire the situation changed radically. Sheffield's population rose to ten thousand by 1736, twelve thousand by 1750, swelling through large-scale immigration to one hundred and thirty-five thousand by 1851 and four hundred and nine thousand by 1901. In the West Riding as a whole, the population had reached five hundred and seventy-four thousand by 1801, rocketing to well over three million by 1911 (31 and 45).

Widespread decimation of the country and major river systems resulted from urban and industrial expansion. For example, Sheffield spread from a sparse community less than three quarters of a mile across in the 1730's to a sprawling six-mile-wide industrial and urban jungle by the end of the 19th century (45). Inevitably developments such as this escalated the production of domestic and trade effluents and brought about the gross pollution of all major river systems in the region, resulting by the 1860's in the decimation of their once rich fish stocks. The floods of 1864 which flushed foul water down from the sewers and heavy industries of Sheffield, Rotherham and other expanding industrial towns along the Don left in its wake vast quantities of dead fish, and in 1868 F. J. S. Foljambe, M.P. complained that "large quantities of filth and sewage were poisoning the river and killing off the fish" (12 and 33). Being robbed of a major food resource, the remaining otters were increasingly driven to rely on the closely keepered fishing ponds, thus exposing themselves to human attack. The effect was disastrous, Hatfield in 1886 noting that "extermination on the banks of preserved ponds and pools had been nearly if not wholly accomplished".

THE 'OTTER CRASH'

The escalating level of persecution experienced during the 18th century together with the increasing rate of habitat destruction and water pollution during the early 19th century seem to have been responsible for a series of sudden crashes in other populations of the South Yorkshire river systems.

(i) The Dearne Catchment Area

In the Dearn and Dove valleys, particularly in the Worsbrough, Rockley and Stainbrough areas where during the early 1700's otters had "abounded" (51), a marked fall in population

was inferred in 1853 by the poet-naturalist, Thomas Lister who wrote in his 'Tributary Ode to Stainborough' (37):—

"The Brown diving otter no longer is gliding
Beneath the fring'd banks of the cool valley rill
Nor bittern is calling, nor curlew is hiding,
Nor badger is hous'd in the cleft of the hill."

And referring to the Tankersley area, Wilkinson in 1872 (51) comments "It certainly possesses no permanent abode here, having become a great stranger".

(ii) Don Valley

The sudden crash in the Don catchment population apparently took place at the close of the 18th century. Hugh Reid (26) noted that "Every hand was uplifted against the otter, its desertion of its old haunts is entirely to be attributed to the incessant vigilance and intense hatred of its habits of destruction of fish". It was reported (26) that the otter had not been seen in any numbers in the Don since about 1800 and William Guest confirmed to Hatfield that "the otter had deserted its former haunts" in the Don by about 1800. A similar decline evidently took place in the waters of the Sheffield area, otters being regarded as a rarity by the 1840's (32).

(iii) The Hatfield Chase Area

The fenland rivers and drains flowing through the Hatfield Chase area, and the North Nottinghamshire of the Idle and Ryton which up till the close of the 18th century were famed as an otter stronghold were also hit by a sharp decline. William Brook of Bawtry (26) noted that by about 1830 the last otters in the Idle and Ryton had gone, and in a letter dated 1863, recorded "Otters appear to have been almost exterminated in the immediate vicinity of Doncaster." Even in the rural Worksop area the known distribution had receded to two localities by 1903 (42).

POST 19th CENTURY DISTRIBUTION AND STATUS

The decline appears to have been a widespread phenomenon in industrial South and West Yorkshire. In 1859 it was regarded as 'very rare' in the trout streams around Kirklees (30) and in 1881 Clarke and Roebuck (13) commented that the otter only occurred in "limited numbers, avoiding the polluted streams of the manufacturing districts."

Away from the main urban and industrial centres and in areas relatively free from water pollution, small relict populations still survived. In 1910, Denny (16) noted that otters were present in unpolluted waters above Sheffield, and Corbet (16) knew of them persisting in the lower Don area. Odd pairs visited and bred at suitable lake sites along the valleys of the Dearne and its tributaries (4, 5, 36, 38, 39, 46 and 47) and the unpolluted waters of north Nottinghamshire and the lower Trent basin still attracted the attentions of one pack of otter hounds. Up to the late 1940's annual, late-summer visits were made by the Buckinghamshire pack which based themselves for their week's sport at Bawtry. Their excursions to the drains of Lincolnshire, the north Nottinghamshire carrs and the lakes at Serlby and Blyth were generally successful, three otters being drawn from Serlby lake (now drained) in 1946 (pers. comm. M. J. Camm).

In the absence of a detailed survey by competent fieldworkers it is impossible to provide a definitive statement on current status. However, based on the scant information available the otter would seem to be absent from most districts or at best a scarce vagrant, with sporadic breeding occurring in widely separated localities in the lower Don valley and the north Nottinghamshire and south Humberside fringes of the area.

CURRENT THREATS

(i) Waterways Disturbance

With the vastly increased usage of the countryside for recreational and leisure pursuits since the second World War and particularly since the 1960's, areas still unaffected by urban and industrial influences have now become the targets for human activity. With otters shunning

contact with man, the increasing interest in water sports (angling, boating, water skiing etc.) places an added burden of disturbance on the remaining populations. Angling interests hotly compete for the unpolluted waters, the 5000 strong membership of the Doncaster angling association being joined by more distant clubs with rights on South Yorkshire stretches, and water sports centres and marinas have been established on hitherto secluded waters, e.g. at Drakeholes on the Chesterfield Canal, Southfield Reservoir and at Lindholme Lake. The increasing level of boating activity on Britain's inland waterways can be demonstrated by monitoring the number of British Waterways Board administrative transactions (the issuing of licences, permits, lock passes etc.). There were 9,247 such transactions in 1963, 12,188 in 1966 and 15,421 in 1968. In 1966 about 3,400 pleasure boats were using the waterways systems, by 1972 the number had risen to over 18,000, increasing by a further 32% to 27,700 in 1973 (9).

(ii) Habitat Destruction

The future of the otter's habitat in South Yorkshire is precarious. Major causes of loss of habitat are drainage of marshland for intensive arable farming, industrial development and the dumping of colliery waste, and the utilization of flooded gravel workings, flooded clay pits and ponds for the dumping of domestic and industrial refuse and power station fuel ash. The clearing out of old secluded canal systems and the clinical management of all categories of water courses greatly reduces the desirability of once suitable areas.

Protection of aquatic habitats through invoking planning restrictions on certain forms of development would be desirable but this method has yet to be witnessed in South Yorkshire. The control of pollution would in time make available many miles of suitable river and canal. However, events have shown that at best, all that can be achieved is the limitation of pollution to its present level.

POSSIBLE CONSERVATION MEASURES

In the lower Don Valley from Doncaster to Thorne and in similar situations along the lower valleys of the Went, Calder and Aire the meandering rivers have been straightened and embanked, giving rise to numerous ox-bow lakes. Ambitious flood embankment schemes, together with canal construction and railway developments, have effectively isolated water meadows and sallow carrs, and through affecting land drainage, have given rise to numbers of ponds and marshes — the nucleus of a continuous series of aquatic habitats invaluable as otter retreats. The simple and potentially spectacular scheme proposed by Bunting (11) to convert into lakes and marshes large areas of embanked water meadow and washland adjacent to the Tidal Don would enormously increase the otter-holding potential of lowland South Yorkshire.

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A number of recent records are available for consultation by *bona fide* workers only at the Museum and Art Gallery, Doncaster.

APPENDIX

Otter records for South Yorkshire and adjacent areas 1544-1970.

1544 — Parish of Tankersley (SE 3/0 and SK 3/9) (26 and 51).
— Parish of Woodkirk (SE 27-24) (26 and 51).
— Parish of Thornhill (SE 25-17-) (26 and 51).

1619-20 — Doncaster (SE 5/0) 12 pence payed to John Harpen and John Roodes for two otters heads (17).

1644 — Worksop (SK 5/7) 1 shilling payed for an otters head (50).

1700s — Engine Wood, Sprotborough (SE 53-01-) (26).
— River Cheswold, Doncaster, near grounds of vicarage (SE 57-03-) (26).
— Doncaster (SE 5/0) — in periods of flooding otters entered the open sewers connected with the Don (26).
— During the latter half of the century Mr. Whittaker, the otter hunter from Auckley regularly hunted on the Don (SE 5/0), the River Torne (SK 6/9, SE 6/0 and 7/0), the River Idle (SK 6/9 and 7/9) and the River Trent (SE 8/1, 8/0 and SK 8/9) (26).
— Worsborough District (SE 3/0) (51).
1706 — Worsborough Parish (SE 3/0). 1 shilling payed to John Wood for an otter's head (51).
— Parish of Arksey (SE 5/0) Church wardens and overseers of the poor accounts (2) record the following:—
1720 — Pd. for 1 otter head 1s.
1723 — Pd. for an otter 1s.
1725 — Pd. to John Broughton for an otter 1s.
— Pd. to John Hill for an otter 1s.
— Pd. for 2 otters 2s.
1727 — Pd. for 2 otters 2s.
1730 — A oter 1s.
1733 — Pd. to Francis Best an otter 1s.
1734 — Pd. to John Hill for an otter 1s.
1736 — Pd. to John Robert for an otter 1s.
1737 — June 3rd John Hill an otter 1s.
,, — Wm. Burley 2 otters 2s.
,, — An otter 1s.
1738 — May 14th for an otter 1s.
,, — June 5th to Sanders, an otter, 1s.
1739 — Otter 1s.
,, — Otter 1s.
1741 — 1 otter 1s.
1744 — Pd. to William Serivit for 1 otter head 1s.
1747 — Otter head 1s.
1756 — Pd. to John Seaton for 2 otters 2s.
1762 — Pd. for five otters 5s.
1790's — Bentley (SE 5/0). William Guest frequently met with the otter in the River Don (26).
1794 — Wheatley (SE 58-05-). Two shot at holt in bank of River Don (26).
c.1800 — Bentley (SE 5/0). William Guest and John Tomlinson caught an otter in Cobshire Dyke-End, near Reedholme House (26).
1804 — River Idle between Bawtry and Stockwith (SK 6/9 and 7/9) (41).
,, — River Ryton between Blyth and Serlby (SK 6/8) (41).
1810 — River Torne at Rossington Bridge (SK 62-99-). One shot by John Wright, corporation game keeper during winter (26).
1812 — The Old Eaa, Potteric Carr (SE 59-00-). One killed by John Wright (26).
1832 — Bawtry, at junction of the rivers Ryton and Idle (SK 65-92-). One shot by Captain John Capil (26).
1833 — Wheatley Ponds (SE 58-05-) (26).
c.1833 — Misson (SK 68-94-) (26).
1838 — Bawtry (SK 6/9). One killed by Thomas Short of Martin (26).
1843 — Sheffield 'neighbourhood' (SK 8/3) (32).
1844 — Wiseton (SK 71-89-). One killed by Rev. Robert Sutton was sent to Hugh Reid, taxidermist on 28th August (26).
1847 — Shirley Pool, Askern (SE 56-11-). One seen by William Guest (26).
1850's — River Torne from Rossington Bridge to Acomb Bridge (SK 6/9 and SE 6/0) (26).

1850 — Sandall Grange (SE 60-05-) (26).
1851 — River Dearn (SE 4/0). Specimen killed during March by H. Hartop of Barnburgh Hall was sent to Hugh Reid for preservation (26).
1855 — River Dearne (SE 4/0) upstream of Melton. An otter killed on 25th April by George Crosby (26).
1858 — Tankersley 'neighbourhood' (SE 3/0 and SK 3/9) (26).
1860 — Kirkthorpe (SE 35-21-) (47).
1868 — River Aire at Brotherton (SE 48-25-) (47).
1869 — River Calder at Stanley (SE 35-23-). One shot 3/12/1869 (47).
1872 — River Dove near Barnsley (SE 3/0). Three seen 12/6/1872 (47).
1881 — River Dearne near Bolton-on-Dearne (SE 4/0). An otter captured (38).
1883 — River Dearne near Bolton-on-Dearne (SE 4/0). Dog otter killed, 16/12/1883. Five had been killed in the Dearne Valley within about two years (38).
1886 — River Dearne near Barnsley (SE 3/0). A pair seen (39).
1894 — Bentley (SE 5/0). One caught 16/12/1894 (18).
1895 — River Rother at Staveley (SK 4/7). Stuffed specimen currently in the possession of Mr. G. Teasdale, shot by T. Lievesley, Jnr. 14/12/1895 near Hartington Colliery.
1903 — Worksop district. Occurs in two widely separated localities (42).
1905 — River Dearne, north of Barnsley (SE 3/1 and 2/1). 'Not uncommon in upper waters' (29).
1906 — Cannon Hall Park (SE 27-07-). One seen (46).
1906 — Cannon Hall Park (SE 27-07-). Two old and two young specimens seen during November in the mill dam (46).
1907 — Bretton Park (SE 28-12-). Otters have bred every season during the last few years (36).
,, — River Dearne at Clayton West (SE 52-11-) (36).
,, — River Dearne at Skelmanthorpe (SE 23-09-) (36).
,, — River Dearne at Darton (SE 31-10-) (36).
1907 — Hoyle Mill at Barnsley (SE 36-06-). A female caught in a rabbit trap at sewage works. The specimen was preserved and presented to Barnsley Museum (5).
1908 — Wheatley (SE 58-05-) (19).
c.1910 — Sheffield district (SK 36-86-). Occurs in limited numbers (16).
,, — Arbourthorne, Sheffield (SK 36-86-). One seen by F. A. Winder (16).
,, — Lower reaches of River Don (SE 6/1). Comparatively scarce (16).
c.1920 — Mexborough Pastures (SE 49-01-). One shot by Mr. Cranridge of Old Denaby, the pelt is still in his possession (pers. comm. C. J. Devlin).
1921 — Wheatley Park (SE 58-04-). Otter killed on railway lines (Doncaster Museum records).
1933 — River Don at Rawcliffe (SE 70-21-). Two young otters caught during the third week of October (8).
1934 — River Aire at Saltaire (SE 14-37-). Specimen weighing 18lb. found dead (21).
1935-7 — Nostell Park (SE 40-17-). Bred at Nostell dam (21).
late 1930's — Thorne Moors (SE 7/1). In the canals (pers. comm. J. Verhees).
1946 — Serlby Park Lake (SK 63-89-). Two otters drawn by Buckinghamshire otter hounds (pers. comm. J. P. Camm).
1947 — Swinefleet warping drain (SE 7/1) (pers. comm. W. Bunting).
1950s — Stainforth area (SE 6/1). Bred during 1950s but young often killed by locals (pers. comm. J. McGarry).
,, — River Ryton (SK 6/9 and 6/7). Occasionally seen by anglers (pers. comm. M. Hanson).
,, — River Idle (SK 7/9, 6/9 & 7/8). Occasionally seen by anglers (pers. comm. M. Hanson).
1952 — Roche Abbey Lake (SK 54-89-) (7).
1957 — Silkstone Fall (SE 29-05-). One dead on railway lines (27).

1958 — Thrybergh Reservoir (SK 47-95-) (28).
1960 — Southfield Reservoir (SE 65-19-) (29).
1963 — River Dearn upstream of Bretton Park (SE 2/1). Seen during May (23).
,, — Scawthorpe area (SE 5/0). Many signs by the Eaubeck (23).
,, — River Dearne upstream at Bretton Park (SE 2/1). Seen during May (23).
,, — Thorne Moors (SE 7/1) (pers. comm. J. Birtwhistle).
1964 — Denaby Ings (SE 49/01) (pers. comm. Mr. Martin).
1966 — Kirk Bramwith (SE 62-11-). One seen in the Stainforth and Keadby canal (pers. comm. J. McGarry).
1967 — Clumber Park (SK 63-75-) (49).
1968 — Mattersey area (SK 6/8) (pers. comm. D. Scott).
,, — Clayworth area (SK 7/8) (pers. comm. D. Scott).
1970 — River Idle at Scaftworth (SK 66-91-) (pers. comm. D. R. Dunston).

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BOOK REVIEW

A Field Guide to the Butterflies of the West Indies by **Norman D. Riley**. Pp.224 with 24 colour plates and 29 text figures. Collins, 1975. £4.50.

The news that Collins have produced another Field Guide and that N. D. Riley is the author suggests something good and the standard we have come to expect is certainly maintained.

The introduction enables the non-entomological nature lover to take an intelligent interest in the butterflies. The main content is designed to help the observer, be he resident or visitor, specialist or not, to identify the butterflies he encounters and this it will surely do, except perhaps for a few difficult species particularly some of the skippers.

The maps of Higgins and Riley's book on Europe have given way to a table of distribution from which we learn very quickly that by far the biggest selection of butterflies is to be found in the two islands of Cuba and Hispaniola — not on the normal British holiday circuit! Jamaica comes next but the popular Windward and Leeward Islands have less variety though enough to be interesting.

No British entomologist visiting these parts should leave this book behind; I wish I'd had it with me when I was last there, especially in St. Lucia.

C.I.R.

A LICHEN COLLECTION FROM THE YORKSHIRE MUSEUM, YORK

B. J. COPPINS
Royal Botanic Garden, Edinburgh

M. R. D. SEAWARD
School of Environmental Science, University of Bradford

A small, but interesting collection of lichens, not referred to in Simms (1968), has recently come to light in the Yorkshire Museum. The material is mounted on 36 sheets and loosely contained in a folder, measuring 17.5 × 22.0 × 5.0 cm, with the spine labelled:

LICHENS
BRITANNICI
IV

The collection is not alphabetically or taxonomically arranged. Since the folder is numbered 'IV' it may have formed part of a more comprehensive collection; the sheets may have been disorganized when the original collection was broken up, and the folder in this state may be merely acting as a temporary holder.

Details of the collection's provenance are unknown, but in all probability it was assembled by, or at least connected with, the Yorkshire botanist John Gilbert Baker (1834-1920), author of *North Yorkshire*, President of the Yorkshire Naturalists' Union (1882-1883), and Keeper of the Kew Herbarium from 1890 to 1899. The handwriting on the sheets is, however, not that of Baker. The specimens listed below as being collected from the Thirsk area are mainly or wholely attributable to him. Also contained in the collection are specimens, for the most part unlocalized, collected by some of the leading botanists of the late 18th and early 19th centuries: William Brunton (1775-1806), James Dalton (1764-1843), Samuel Hailstone (1768-1851), John Harriman (1760-1831), William Jackson Hooker (1785-1865), William Mudd (1830-1879), James Edward Smith (1759-1828) and Dawson Turner (1775-1858).

Contents

Arthonia radiata (Pers.) Ach. (i) smooth bark, Sowerby (62), April 1854, J. G. Baker; (ii) ex herb. Hailstone.

Arthopyrenia biformis (Borr.) Massal. (i) on hawthorn, Thirsk (62), June 1852; (ii) ex herb. Hailstone.

A. fallax (Nyl.) Arnold (as *Verrucaria epidermidis*) on smooth bark, Thirsk (62), Dec. 1853, J. G. Baker.

Bacidia laurocerasi (Del. ex Duby) Vain. (= *B. endoleuca* (Nyl.) Kickx) ex herb. Hailstone.

Buellia punctata (Hoffm.) Massal. on willow, Holmes, Thirsk (62), Feb. 1850.

Calicium abietinum agg. (as *C. lenticulare*) on ash, Leckby (65), June 1852.

Caloplaca cerina (Ehrh. ex Hedw.) Th. Fr. ex herb. Hailstone.

Catillaria griffithii (Sm.) Malme (as *Lecidea pinicola*) Sowerby (62), Jan. 1851.

Catinaria grossa (Pers. ex Nyl.) Degel. (i) Airyholme, Cleveland (62), 1853, W. Mudd; (ii) ex herb. Hailstone.

Cladonia impexa Harm. Sutton Bank, Thirsk (62), Dec. 1853.

Collema auriculatum Hoffm. (i) (as *C. fluviatile*) Skipton Springs, Craven (64), S. Hailstone (see Lees, 1888, p. 632); (ii) (as *C. sinuatum*) . . . in herb. Hailstone; (iii) (as *C. atrocaeruleum*) Crinah Bottom, Ingleborough (64), S. Hailstone.

C. crispum (Huds.) Web. (as *C. atrocaeruleum*) Crinah Bottom, Ingleborough (64), S. Hailstone.

C. cristatum (L.) Web. (as *C. crispum*) walls, Kendal (69), S. Hailstone.

C. polycarpon Hoffm. walls, Kendal (69), S. Hailstone.

C. subfurvum (Müll. Arg.) Degel. (as *C. nigrescens*) ex herb. Hailstone.

C. tenax (Sw.) Ach. (as *C. fluviatile*) Skipton Springs, Craven (64), S. Hailstone.

Dermatocarpon cf. *hepaticum* (Ach.) Th. Fr. (as *Endocarpon lachneum*) ex herb. Dalton.

D. miniatum (L.) Mann ex herb. Dalton.
var. *complicatum* (Lightf.) Hellb. Falcon Clints, Teesdale (66), July 1853, J. G. Baker (cf. Leighton, 1879, p. 442).
Graphis elegans (Borr. ex Sm.) Ach. (i) on holly, . . . , Cleveland (62), Aug. 1853, W. Mudd; (ii) (as *Opegrapha atra*) ex herb. Dalton.
G. scripta (L.) Ach. (i) on hasel *(sic.)*, Thirsk (62), 1853, J. G. Baker; (ii) ex herb. Dalton; (iii) ex herb. Hailstone.
Lecanora carpinea (L.) Vain. ex herb. Hailstone.
L. expallens Ach. Sowerby (62), Jan. 1851.
Lecidea limitata (Scop.) Gray (i) smooth bark, Sowerby (62), April 1854, J. G. Baker; (ii) ex herb. Hailstone.
Leptogium burgessii (L.) Mont. (i) Sir J. E. Smith in herb. Dalton; (ii) Scotch Highlands, Sir W. J. Hooker (see Leighton, 1879, p. 33).
L. cyanescens (Pers.) Körb. (as *Collema tremalloides*) ex herb. Dalton.
L. cf. *minutissimum* (Flörke) Fr. (as *Collema subtile*) nr. Yarmouth (27), from Mr. Turner, ex herb. Dalton (see Leighton, 1879, p. 26).
L. plicatile (Ach.) Leight. (i) (as *Collema fluviatile*) Malham Cove (64), 1807, S. Hailstone (cf. Lees, 1888, p. 632 & p. 806); (ii) (as *Collema fluviatile*) Skipton Springs, Craven (64), S. Hailstone (cf. Lees, 1888, p. 632 & p. 806).
L. sinuatum (Huds.) Massal. (as *Collema atrocaeruleum*) Crinah Bottom, Ingleborough (64), S. Hailstone.
L. tenuissimum (Dicks.) Körb. ex herb. Dalton (cf. Lees, 1888, p. 633).
Massalongia carnosa (Dicks.) Körb. ex herb. Dalton.
Mycoblastus sanguinarius (L.) Norm. Eglestone, Teesdale (66), Rev. J. Harriman.
Opegrapha atra Pers. ex herb. Dalton.
O. herbarum Mont. ex her. Hailstone.
O. varia Pers. on ash, Thirsk (62), May 1852.
O. vulgata (Ach.) Ach. (i) on hawthorn, Thirsk (62), June 1852; (ii) ex herb. Hailstone.
Parmelia saxatilis (L.) Ach. rocks, Sutton Bank, Thirsk (62), Dec. 1853.
P. subaurifera Nyl. (i) on sycamore, Thirsk (62), July 1852; (ii) smooth bark, Sowerby (62), April 1854, J. G. Baker.
P. sulcata T. Tayl. on sycamore, Thirsk (62), July 1852.
Pertusaria albescens var. *corallina* (Zahlbr.) Laund. on sycamore, Thirsk (62), July 1852.
Physcia adscendens (Th. Fr.) Oliv. em. Bitt. on Hawthorn, Thirsk (62), June 1852.
Polychidium muscicola (Sw.) Gray Eglestone, Teesdale (66), Rev. J. Harriman (cf. Turner & Dillwyn, 1805, p. 255).
Porina chlorotica var. *carpinea* (Pers.) Keissl. on hawthorn, Thirsk (62), June 1852, J. G. Baker.
P. olivacea (Pers.) A. L. Sm. on hawthorn, Thirsk (62), June 1852, J. G. Baker.
Sphaerophorus fragilis (L.) Pers. Highgreen Wood, nr. Halifax (63) (cf. Crump and Cross land, 1904, p. 216).
S. globosus (Huds.) Vain. (i) Highgreen Wood, nr. Halifax (63) (cf. Crump and Crossland, 1904, p. 216); (ii) rocks, Sutton Bank, Thirsk (62), Dec. 1853; (iii) ex herb. Dalton; (iv) ex herb. Hailstone.
S. cf. *globosus* (Huds.) Vain. (as *S. compressum*) Falcon Clints, Teesdale (66), July 1853, J. G. Baker (see Leighton, 1879, p. 48).
S. melanocarpus (Sw.) DC. ex herb. Dalton.
Umbilicaria cylindrica (L.) Del. ex Duby (as *U. proboscidea*) nr. Eglestone, Teesdale (66), Rev. J. Harriman.
U. polyphylla (L.) Baumg. (i) Brimham Rocks, Ripon (64), W. Brunton, *c.fr.* (= rare) (see Lees, 1888, p. 645); (ii) Brackenhall . . . (?), S. Hailstone.
U. polyrrhiza (L.) Fr. (i) Stansfield Moor, nr. Halifax (63) (cf. Crump & Crossland, 1904, p. 223); (ii) ex herb. Hailstone.
U. proboscidea (L.) Schrad. ex herb. Dalton.
U. pustulata (L.) Hoffm. ex herb. Hailstone.

U. torrefacta (Lightf.) Schrad. (chemical strain, med. C+red) Stansfield Moor, nr. Halifax (63) (cf. Crump & Crossland, 1904, p. 223).

ACKNOWLEDGEMENTS

We wish to record our thanks to Mr. C. Simms, Keeper of Natural History at the Yorkshire Museum, for providing us with the opportunity to examine this collection, and to Dr. D. A. Reid and Mr. J. R. Laundon for examining the handwriting.

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PINK-FOOTED GOOSE FATALITIES AT THE HUMBER WILDFOWL REFUGE

BRIAN S. PASHBY

Secretary, Humber Wildfowl Refuge Committee

The Humberside population of the Pink-footed Goose *(Anser brachyrhynchus)* begins to arrive on the Humber Estuary from about mid-September and at this time the birds feed mostly on the stubble fields of the Yorkshire and Lincolnshire Wolds and roost on the Whitton Sand within the Humber Wildfowl Refuge. Later they feed in low-lying fields near the Estuary and from mid-November gradually move to more southerly areas, including possibly, the Wash. During the mid-winter period there are usually few geese at the Refuge but in most years an influx occurs during February which appears to be part of the spring migration. The following description of the disaster which overcame the Humber geese early in 1975 is based largely on the report of Arthur Chapman, Warden of the Refuge.

On 31st December 1974, after a four week period during which the daily number of geese recorded at the Refuge never exceeded 280, A.C. was surprised to note 1,180. Clear moonlit periods prompted these new arrivals to make overnight feeding missions as was obvious on the 5th January 1975 when, before dawn, the Refuge was devoid of geese. It was during this day that A.C. watched the birds commuting from and to an area which he calculated was near the village of Coleby (Lincolnshire), about three miles south of the Refuge. On the 6th January Mr. B. Crossland, of the Adlingfleet and District Wildfowlers and Conservationists, found 27 dead and dying Pink-feet on the Alkborough Flats shore and immediately informed the Ministry of Agriculture, Fisheries and Food, Brigg (Lincs.) and the R.S.P.C.A., Scunthorpe. Mr. G. Black, Field Officer of the former and Inspector Russell of the latter visited the scene shortly afterwards. At about the same time 12 dead Pink-feet were recovered from the north shore of the Refuge near Faxfleet. These were seen by A.C. who noted grains of wheat in the bills of the dead birds and in some cases, an emission of a yellowish-brown fluid therefrom. He informed Mr. P. Moody of the M.A.F.F., Beverley (Yorks.).

On the 8th January following the recovery of several more carcases on the south shore, four specimens of geese and a Great Black-backed Gull *(Larus marinus)* were sent by Mr. Black to the M.A.F.F. Pest Infestation Control Laboratory at Tolworth, Surrey and four more, collected from the north shore between Thornton Land Clough and Brough Haven were sent there, with a dead Herring Gull *(L. argentatus)*, by Mr. Moody. The same day A.C. sent three specimens to the Monks Wood Experimental Station, Abbots Ripton. Following a report of dead geese being found on a newly sown field in the Coleby area, it was established

that 21 geese had died on the 6th/7th January on a field sown with winter wheat dressed with carbophenothian ("Trithion"). Two of these geese together with grain samples were also sent to Tolworth. The field evidence suggests that the geese had fed in the Coleby area during the 5th/6th January and a large number had subsequently died on the Refuge. The results of the chemical analyses at both Tolworth and Monks Wood on the thirteen geese were very similar, the birds had died through consuming the seed dressing "Trithion". Of the other two species which were examined, the Great Black-backed Gull had died through a lung disease, aspergillosis, and the Herring Gull through gun shot trauma.

Throughout January the shores of the Humber were searched for Pink-foot corpses as well as any other recently dead species possibly connected with the incident. Many people helped, local wildfowlers, R.S.P.B. staff, "Birds of Estuaries Survey" counters, the coxswain and crew of the British Transport Docks Board launch (many floating corpses were seen by these men). The known death roll reached 243 but such are the extremely fast currents in the Humber that it is quite possible that many more dead Pink-feet may have been carried to the open sea, or washed up in areas unchecked. The sudden reduction of the Pink-foot population on the Refuge in a very short time to something like 300 birds is significant and it is possible that the real figure for casualties could be 1,000. Apparently no other species were involved although many Wood Pigeons *(Columba palumbus)* were known to have fed on the field in question and it is difficult to imagine that no other species of wildfowl fed there. Many of the goose carcases were eaten by Great Black-backed Gulls, Herring Gulls, Carrion Crows *(Corvus corone)* and Foxes *(Vulpes vulpes)* but there was no evidence of secondary poisoning.

In discussing the circumstances under which these geese fell victims it is necessary to go back to the autumn of 1974. Heavy and prolonged rain not only delayed harvesting but made the autumn sowing of winter corn impossible and, in many areas, it was not until late December that this operation was carried out. Dressed wheat had been obtained for normal autumn sowing of the field in question but not until after a short "drying out" period in late December was it possible to sow. Even then the ground was so wet that it could only be drop-sown and disc harrowed. In addition, the feed of the drill was adjusted to allow an extra 20% deposit of grain. A plentiful supply of dressed wheat was thus lying on, or just below the surface on the 3rd/4th January 1975. Had it been possible to sow this grain in autumn it should have been well below the surface and at a time when geese would normally have been feeding on autumn stubble fields. As well as the effect of the weather on agricultural operations, the result of the very mild temperatures had a significant effect on the migration of some species. There is every reason to consider that the appearance of 1,200 geese at the Refuge on the 31st December 1974 was connected with the spring migration of the species some four to six weeks earlier than usual.

The results of the M.A.F.F. tests are summarised in the table by Brown *et al.*, 1976 Brain acetylcholinesterase activities measured in the goose specimens are compared with those of two Pink-feet shot for the purpose at Loch Leven, Perthshire, those of the two gulls were within the normal range. The level of carbophenothion residues are obviously high in the gizzard contents. Samples of grain from the proventriculus region of all the specimens were analysed for carbophenothion residue and the results, in terms of ppm based on dry weight of grain analysed were in the range of 800—1,000 ppm. This agrees with the grain sample from the field at Coleby, where 21 of the geese were found dead, which contained 1,215 ppm of carbophenothion (P. I. Stanley in litt.). One of the specimens sent to Monks Wood was analysed and in this case, a sample of grain from the proventriculus showed a level of 170 ppm. The quantity of grain in the three birds sent there is interesting. One of them contained 71g moist grain (representing approximately 920 individual wheat grains); the other two had each ingested at least 500 grains.

Carbophenothion, an organophosphorous compound, has previously been involved in large scale poisoning incidents, first in Perthshire in November 1971 when 500 Grey Lag Geese *(A. anser)* were killed (Bailey *et al* 1972) and again in November 1974 in Angus when *c*325 Grey Lags died (Brown *et al.*, 1976). Here again a large quantity of dressed grain was readily available to geese. Carbophenothion, while not a persistent poison like Dieldrin is an

acute one and is of generally low toxicity to most species, but it is now well known that some organophosphorous compounds while having a low toxicity to most species can be highly toxic to a few. It is possible then, that carbophenothion is highly toxic to Grey Lags and Pink-feet, but there is always the possibility that the lethal effects could have been caused by the large quantity of poison taken while eating such large amounts of the dressed grain. However, in this respect it is relevant to point out that shortly after the Humber incident A.C. visited the field at Coleby and in addition to seeing Partridge *(Perdix perdix)* feeding in the field, saw Pheasants *(Phasianus colchicus)* breaking covert from a plantation which formed one edge of the field. The fact that Pheasants are notoriously voracious grain eaters prompted him to search the woodland for any evidence that might have indicated that this species had been involved, but without success.

TABLE 1. Cholinesterase activity and carbophenothion residues in tissues of Pink-footed Geese from Humberside incident, January 1975.

		Carbophenothion residues			
Origin of specimen	*Brain Cholinesterase activity*	*ppm brain*	*ppm muscle*	*ppm liver*	*ppm gizzard contents*
Alkborough	0.9	0.9	2.4	1.5	260
Alkborough	1.6	0.07	0.2	nd	180
Alkborough	2.2	0.1	0.4	0.05	300
Alkborough	1.3	0.3	1.2	0.1	220
Faxfleet	2.1	0.2	0.6	0.03	190
Faxfleet	0.9	1.3	3.1	1.6	290
Faxfleet	0.5	1.4	2.8	2.3	190
Faxfleet	0.8	0.8	0.9	0.4	210
Coleby	1.3	1.0	2.1	1.1	210
Coleby	0.9	0.9	0.8	0.4	90
Loch Leven (shot control	8.5	Tissues not available for analysis			
Loch Leven (shot control)	8.9				

Whatever the reasons for the apparent high toxicity to geese, what measures, if any, can be taken to prevent a repetition of these three known incidents? A more rigid definition of "autumn sowing" might help, incorporating a date after which dressed grain should not be sown, as was the case with Aldrin and Dieldrin (M.A.F.F. advice being that cereal dressed with these chemicals should not be sown after the 31st December). However, it is the method of sowing which contributed significantly to the casualties in both incidents and it is on this point that some definite instruction might be given by the M.A.F.F., advising that the broadcasting of dressed grain should only be resorted to in exceptional circumstances and *only on condition* that bird scaring methods are used. Indeed, it would be a good thing if this condition was made statutory.

One small incident afforded some satisfaction when, during the period following Mr. Crossland's initial discovery of dead geese on the Alkborough shore, he found a distressed Pink-foot which he took home and, on the advice of the local R.S.P.C.A. administered a liberal dose of liquid paraffin. It is pleasing to record that the bird recovered and was eventually released to the wild.

ACKNOWLEDGEMENTS

Many people helped in the investigation of the incident and the Refuge Committee would especially like to thank the four Field Officers of the M.A.F.F., Messrs. P. Moody, J. Lambert, G. Black and D. Coates; Dr. P. I. Stanley and others of the Pest Infestation Control Laboratory, Tolworth; Dr. J. L. F. Parsloe and Dr. A. A. Bell of the Nature Conservancy Council Monks Wood Experimental Station; Messrs. R. Hawley, A. Grieve and G. Cornford of the R.S.P.B., who, with several wildfowlers including Messrs. F. Morgan, H. Tait, A. Leek and D. Stead, spent much time and hard work in searching for dead birds. Finally we would like to express our gratitude to Mr. B. Crossland of the Adlingfleet and District Wildfowlers and Conservationists, whose prompt action in informing the appropriate authorities was most commendable and to the Warden, Arthur Chapman, who, in addition to the day to day work imposed on him by the whole affair, prepared such a splendid report on the incident.

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KATHLEEN M. MOREHOUSE
1912 — 1975

The alarming news of the sudden illness of Kathleen Morehouse came as a great shock to her many friends. When this was followed by the announcement that she had passed away after a serious operation the alarm turned to deep sorrow. The shock was particularly great to those with whom she had been in contact during the summer and even up to the day prior to the operation. The letter she wrote on that day gave evidence of her abundant high spirits and optimism when, undaunted by the thought of losing a limb, she wrote "so I shall be Hopalong Kate for some time". Unfortunately this was not to be and the world is a poorer place now that she has left it.

Kathleen was educated at Doncaster High School for Girls, after which she spent some time with a Nursery Gardener to widen her experience before going up to Leeds University where she graduated with an Honours Degree in Botany and Zoology in 1940. Following a short teaching appointment at Leighton Buzzard High School for Girls she joined the staff of the Doncaster Technical College in 1941 as Lecturer in Biology, a post she held until her retirement in 1971.

Union membership dated from 1928 and she was one of the few Life Members. She was, of course, one of the more active members who attended most of the field meetings, formerly with her mother, and latterly on her own. Her particular interests were Conchology and Mycology. She served the Conchology Section as Secretary for several years and was also Chairman on occasion. She was a member of the Conchological Society of Great Britain and Ireland and Council Member and Past President of the Yorkshire Conchological Society. Association with the Mycological Section spread over many years and she was a familiar figure at Fungus Forays. She was Executive Representative for the past four years as well as serving as the current Chairman. She also held the offices of Secretary and President during her active membership of the Doncaster Naturalists' Society.

Kathleen's activities were not confined to natural history and her many and varied interests included boundless enthusiasm for the N.S.P.C.C. She was also an active playing member and Treasurer of the Doncaster Bridge Club. She was an entertaining and knowledgable conversationalist and a most congenial companion: she will be greatly missed.

E. DEARING

THE SPHAERIIDAE FAUNA OF THE HUDDERSFIELD NARROW CANAL

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Studies of many plant and animal groups have revealed the existence of zonal distributions of species down the lengths of running waters (Hynes 1970). Hitherto little attention has been given by British workers to the detailed patterns of distribution of members of the family Sphaeriidae inhabiting water courses. This matter is now receiving attention in a research project in progress at Huddersfield Polytechnic. The present paper reports the results of a preliminary survey of the Sphaeriidae fauna of the Huddersfield Narrow Canal, made in April 1972.

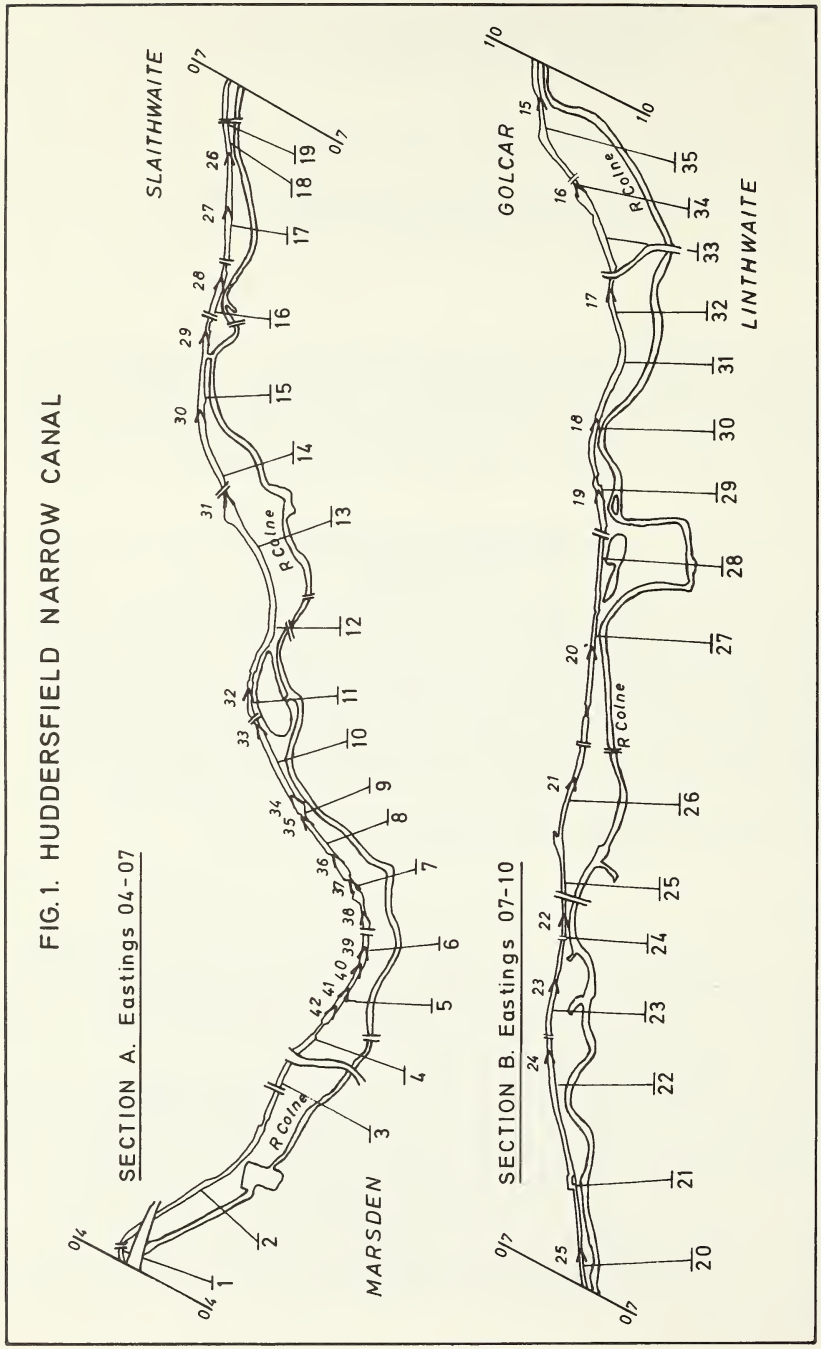
The Huddersfield Narrow Canal runs from the Ashton Canal, Ashton-under-Lyne, to the Huddersfield Broad Canal in Huddersfield, which connects with the rest of the Calder-Hebble navigation. The last commercial traffic used the Huddersfield Narrow Canal around 1944. In 1950 all the locks were weired thus preventing continuous navigation. Since 1950 the locks have been progressively cascaded and in one part through Slaithwaite, the canal is culverted and runs underground. Since this survey a further section of the canal has been culverted, between Manchester Road and Chapel Hill, Huddersfield.

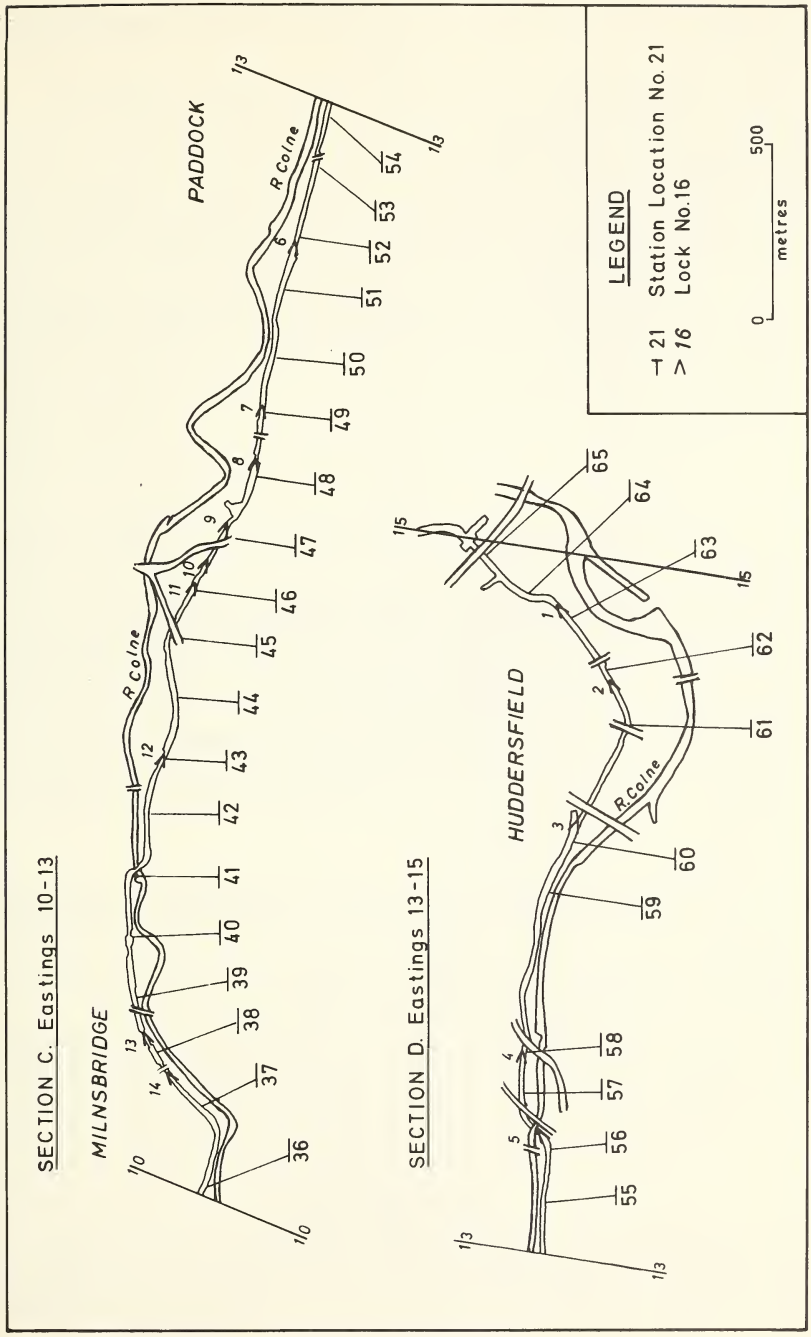
The canal was surveyed from its point of exit from the Stanedge Tunnel above Marsden (OS Reference; SE 039 119) to its junction with the Huddersfield Broad Canal in Huddersfield (OS Reference; SE 149 165). A section of the canal as it emerges from the culvert west of Slaithwaite had been drained when this survey was carried out and works were in progress in cascading one of the locks. Access to the canal is not possible at two points along the stretch between Longroyd Bridge, Huddersfield and the Wakefield Road. Figure 1 shows a map of the canal indicating the location of the sampling stations and the locks.

Methods

The canal bottom was sampled at approximately 200 m intervals. Where the 200-metre point fell at a lock, a point immediately above or below the obstruction was sampled, depending on which point was nearest to the 200-metre mark. A standard sweep over approximately one metre was made, one metre in from the south bank of the canal, using a D net, mesh size one millimetre square. The net contents were transferred to a container for transport to the laboratory. Samples were taken from 65 stations.

Each sample was washed through a nest of Endecotte sieves, with mesh sizes of two millimetres, one millimetre and 0.5 millimetre. The two millimetre and one millimetre fractions were hand-sorted and the animals removed. The 0.5 millimetre fraction was sorted using a binocular microscope (×20 magnification). Material was stored in 50% alcohol and was subsequently prepared for identification as follows: individuals were placed separately in semi-micro test tubes containing 3% potassium hydroxide solution and then placed in a water bath at 90°C for approximately ten minutes. This treatment cleans the shell and dissolves the hinge ligament thus enabling identification to be made using hinge plate characters (Ellis, 1962). Examples of each identified species were later sent for checking to Dr. M. P. Kerney of the Department of Geology, Imperial College of Science and Technology, London.


FIG. 1. HUDDERSFIELD NARROW CANAL
SECTION A. Eastings 04-07
SECTION B. Eastings 07-10
MARSDEN
SLAITHWAITE
GOLCAR
LINTHWAITE
R Colne
R Colne
R Colne


SECTION C. Eastings 10-13
MILNSBRIDGE
PADDOCK
R Colne
SECTION D. Eastings 13-15
HUDDERSFIELD
R Colne
LEGEND
21 Station Location No. 21
16 Lock No.16
0
500
metres

RESULTS

The following list shows the species of Sphaeriidae found in the survey of the Huddersfield Narrow Canal.

Pisidium amnicum (Müller)
Pisidium casertanum (Poli)
Pisidium henslowanum (Sheppard)
Pisidium hibernicum (Westerlund)
Pisidium moitessierianum (Paladilhe)
Pisidium nitidum (Jenyns)
Pisidium obtusale (Lamarck)
Pisidium pulchellum (Jenyns)
Pisidium subtruncatum (Malm)
Sphaerium corneum (Linnaeus)

Pisidium milium (Held) was not found during this survey but was collected in January 1972 in a less extensive survey covering only five stations and has also been found during subsequent work on the canal.

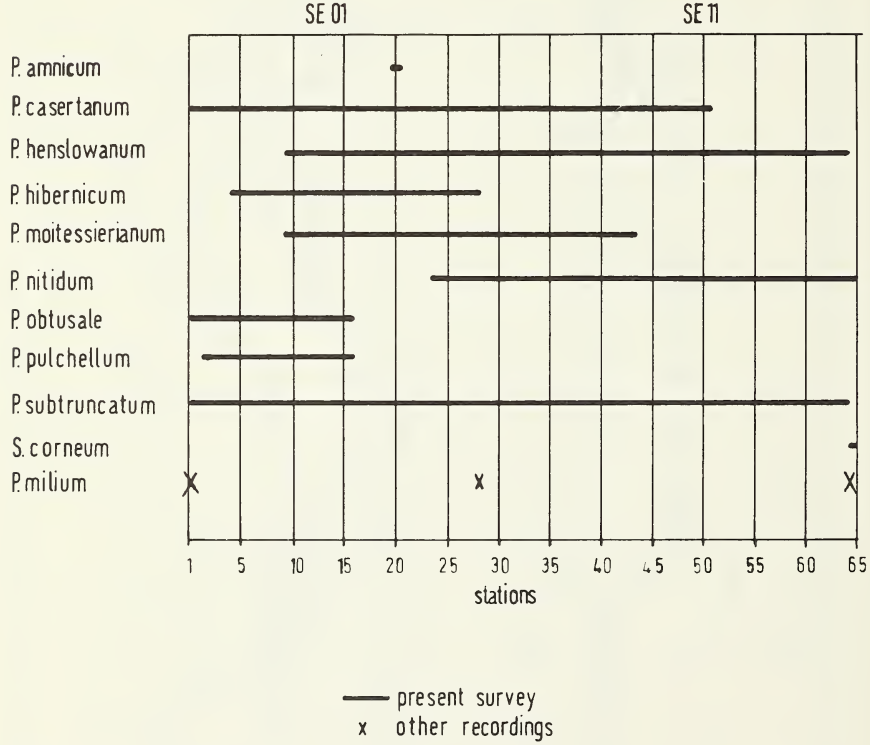


Figure 2. Distribution ranges of *Pisidium* and *Sphaerium* species in the Huddersfield Narrow Canal.

TABLE 1.

OCCURRENCE OF SPHAERIIDAE IN THE HUDDERSFIELD NARROW CANAL

Station	P. amnicum	P. casertanum	P. henslowanum	P. hibernicum	P. moitessierianum	P. nitidum	P. obtusale	P. pulchellum	P. subtruncatum	S. corneum
1		+					+		+	
2		+					+	+	+	
3		+							+	
4		+					+		+	
5		+								
6		+		+			+	+	+	
7		+		+			+		+	
8		+					+		+	
9			+		+		+		+	
10		+	+				+		+	
11		+		+						
12			+				+		+	
13			+				+		+	
14							+			
15				+			+		+	
16							+	+		
17										
18										
19										
20	+				+					
21										
22										
23										
24										
25		+								
26			+	+						
27			+	+	+				+	
28			+	+		+				
29		+			+					
30		+								
31			+							
32										
33			+						+	
34			+						+	
35										
36										
37				+					+	
38										
39									+	
40									+	
41										
42										
43					+				+	
44		+								
45										
46										
47										
48		+	+							
49										
50			+						+	
51		+	+							
52										
53										
54										
55										
56										
57										
58										
59										
60						+			+	
61										
62										
63										
64			+						+	
65						+				+

Table 1 and Figure 2 show the results of the survey. Table 1 shows that Sphaeriidae were absent from the following stations:
17-19, 21-24, 32, 35, 38, 41-42, 45-47, 49, 52-59 and 61-63.

Pisidium obtusale, Pisidium hibernicum and *Pisidium pulchellum* were all restricted to the upper stations (1-28); *Pisidium amnicum* was extremely restricted, occurring only at station 20; *Pisidium subtruncatum* was found more or less throughout the system; *Pisidium casertanum* was found in all but the lower stations (1-51) and *Pisidium henslowanum* in all but the uppermost stations (9-65); *Sphaerium corneum* was very restricted, occurring only at the lowest station (65). *Pisidium milium* has been recorded both before and since this survey and appears to exhibit an extremely disjunct distribution occurring at places equivalent to stations 1, 28 and 65 of the present survey. Both *P. moitessierianum* and *P. nitidum* occur sporadically, the former between stations 9 and 43 and the latter at stations 28, 60 and 65. Figure 2 shows the ranges over which the species occur.

Discussion

Two sources of records of the distribution in Yorkshire of members of the genus *Pisidium* are used in the discussion of the present work. These are:

1. Vice-comital records reported in the "Census of the distribution of the British non-marine Mollusca" (Ellis, 1951).

2. 10 km grid-square records of the Conchological Society of Great Britain and Ireland, which is currently conducting a mapping scheme for the non-marine Mollusca of the British Isles. This scheme, based on a smaller unit area, should provide a more sensitive indication of the distributions of species (Kerney, 1967). Although this survey is not completed, the results, to date, provide a more detailed and probably more realistic picture of the distribution in Yorkshire of members of the genus *Pisidium*, than that given by vice-comital records. Yorkshire 10-km grid-square records have been supplied by Adrian Norris of Leeds City Museum.

The present survey covers the 1:250000 first series of ordnance survey maps SE01 and SE11.

According to the 10-km square records *Pisidium casertanum*, *P. subtruncatum* and *P. nitidum* are extensively distributed in Yorkshire and all have been recorded previously for the five vice-counties (Ellis, 1951). Nevertheless, the presence of *P. casertanum* in SE01 and of *P. nitidum* in both SE01 and SE11, are additions to the 10-km grid-square mapping scheme.

Ellis (1951) reports the occurrence of *P. milium* and *P. amnicum* in all of the five vice-counties. Notwithstanding, results so far for the 10-km square mapping scheme suggest that these two species are not as widespread in Yorkshire as *P. casertanum, P. subtruncatum* and *P. nitidium*. In the present survey *P. amnicum* was found in SE01; a new 10-km grid-square record. *P. milium* was not recorded in this survey but it has been collected at other times during the investigation in both SE01 and SE11; its occurrence in SE01 is a new record for this 10-km square.

Pisidium obtusale and *P. henslowanum* are recorded for all five vice-counties. However, the more recent 10-km grid records suggest that these two species are less widespread in Yorkshire than the foregoing species. This study showed that both species occur in SE01, but only *P. henslowanum* was present in SE11. The occurrence of *P. henslowanum* in SE11 and *P. obtusale* in SE01 are new records for these 10-km squares.

Pisidium hibernicum is known from four of the vice-counties; it is not recorded for vice-county 65. The 10-km grid records indicate a rather patchy distribution for this species; it is recorded for only 4% of the 10-km squares of Yorkshire. In this survey, *P. hibernicum* was found in SE01, a new record.

In the 1951 census report *Pisidum pulchellum* was described as "widely but rather sporadically distributed" in the British Isles and in Yorkshire it was recorded only for vice-county 62. More recently, Stratton (1957) recorded it for Gordale Head in vice-county 64. This appears to have been the only site reported for this species in the county since the 1951 census. *P. pulchellum* was found in SE01 in the present survey. Although a new 10-km grid-square record, it is not a new vice-county record since it was collected in the Halifax district (SE02) in 1853 (Dr. M. P. Kerney, pers. comm.).

Pisidium moitessierianum, which was found in both SE01 and SE11, is a new vice-comital record for Yorkshire south-west. The only other record is for the River Wharfe at Boston Spa (SE44), collected in 1920 (Dr. M. P. Kerney, pers. comm.; Ellis, 1951). According to Dr. Kerney the Huddersfield Narrow Canal is the most northerly recently recorded British site for this species.

This study, like that of Lloyd-Evans (1975) emphasises the value of intensive surveys. Ten out of the sixteen living British members of the genus *Pisidium* were recorded in this survey over about 13.5 kilometres of canal.

The results presented suggest a possible zonal distribution of species down the length of the Canal. An investigation into the environmental factors responsible for this pattern of distribution is currently in progress at Huddersfield Polytechnic.

Acknowledgements

We should like to thank the following for their help: Dr. M. P. Kerney of Imperial College for checking our identifications and supplying past records; Mr. A. Norris of Leeds City Museum for providing distribution maps of the *Pisidium* species in Yorkshire; the British Waterways Board for sanctioning this study and providing us with details of the Huddersfield

Narrow Canal; and Mr. J. E. Wrathall and Mrs. M. Brooke of Huddersfield Polytechnic for preparation of the maps.

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TRUNCATELLINA CYLINDRICA (FÉRUSSAC) IN YORKSHIRE

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On 21 September 1975, Dr. L. Lloyd-Evans found a single dead specimen of the gastropod *Truncatellina cylindrica* (Férussac) whilst examining a small sandy grass covered slope facing almost due south, at the top edge of an old Magnesian Limestone quarry in Went Vale near Pontefract, South-west Yorkshire, part of the Brockadale Nature Reserve (SE(44) 501176). This important find stimulated an intensive search of the area with the result that several other dead examples and a single live specimen were found.

With the rediscovery of *Truncatellina* it seemed desirable to examine all the old records of this species in Yorkshire, and the information available on them. Although there are few records, those that do occur are surrounded with confusion and a great deal of misunderstanding. In order to rationalize the situation I have collated all the available information in this paper, and included a number of observations which I hope will help to clarify the situation.

Note — The name *Vertigo minutissima* Hartmann was used to denote what are now considered to be two species, *Truncatellina cylindrica* and *T. callicratis britannica* Pilsbry. Both are very small and difficult to find. *T. cylindrica* is the more common of the two, being recorded from a number of sites throughout Britain, whilst *T. britannica* is known only from the south coast.

The sites are listed in vice-county order and then in order of grid-reference.

Vice-county 61, Yorks, South-east.

Kilnsea Warren, Spurn (TA(54) 4115).

Three specimens of *"V. minutissima"*, were recorded from under an old basket on 4 August 1894, by T. Petch, and authenticated by J. W. Taylor. The specimens, formerly in the Hull Museum (destroyed by bombing (1941)) were identified by A. E. Boycott in 1931 as *Truncatellina cylindrica sensu stricto*, (Census MS). In his notes on this find Petch (1904), thought it hardly probable that this species was indigenous on Spurn, and suggested that they may have been transported on drift-wood from some point higher up the River Humber. The recorded habitat at Spurn is very similar to sites on the Lincolnshire coast where this species has been found, and therefore its occurrence on the dunes is not so improbable. *T. cylindrica* likes a sandy soil with a light covering of grasses, and is usually found at the base, or in the roots of these grasses.

Vice-county 63, Yorks, South-west

Kiveton Park Railway Station near Anston Stones (SK(43) 509828).

In a short field note in the *Naturalist*, Edgar Pickard (1885), records the occurrence of *"V. minutissima"* amongst the roots of grass on a roadside verge near to Kiveton Park Railway Station and gives the following detailed account of the locality; "On leaving the station in the direction of Anston the road winds up a steep hill, just at the brow of the hill there is an old wall: I have found *V. minutissima* in considerable numbers". Charles Oldham and A. E. Boycott identified the specimens in the Royal Scottish Museum as *T. cylindrica sensu stricto* in 1939 (Census MS).

An examination of this site which I undertook in 1972 proved very disappointing, as the area between the road and the wall had been covered with a layer of tarmacadam. I searched several other likely sites in the area but failed to locate even an empty shell. A much fuller examination particularly of the older parts of the Magnesian Limestone quarry near to the station, may however prove rewarding.

Went Vale near Pontefract (SK(44) 501176)

Truncatellina was first recorded from Yorkshire from Went Vale by Charles Ashford and was reported under the name *Vertigo minutissima* in an article on the shells of the Ackworth district (Ashford 1874). In this article he lists five species of *Vertigo* as being found in association; *V. pygmaea* Drap., *V. substriata* Jeff., *V. pusilla* Mull., *V. edentula* Drap. (= *Columella* sp.) and *V. minutissima*, and in a further paper (Ashford 1888) he reports the occurrence of a sixth, *V. angustior* Jeff. The habitats normally required for these six species are in at least two cases very different, and therefore a good deal of doubt has been expressed both by myself, (Norris & Colville 1974), and by others as to the authenticity of this association. Although specimens of *Truncatellina* were found at regular intervals after his original find, sometime about 1854, for over 50 years, no other recorder mentions the other associated species.

The records of *Truncatellina* from Went Vale have been smothered under a wealth of confusion, misidentification and misunderstanding with the result that some people recorded *T. cylindrica* whilst others recorded *T. britannica*. This confusion was added to even more when specimens labelled *T. britannica* were examined by Hugh Watson, who reported (1943): "I have seen two sets of shells labelled '*T. britannica* Pils. Went Vale', and both are wrongly identified". One set of five specimens proved to be *T. cylindrica sensu stricto*, whilst the other set of three proved to be *T. costulata* (Nilsson) a species not recorded for Britain. He suggests that the label may have been placed with continental examples of *T. costulata* in error, but unfortunately he omits to record the name of the collector, the date or the whereabouts of these specimens. I am informed however by Dr. P. Mordan of the British Museum (Nat. Hist.) that the five specimens of *T. cylindrica sensu stricto* spoken of by Hugh Watson are in the A. E. Ellis collection housed in the B.M. (Nat. Hist.). There are no *Truncatellina* from Went Vale in the Ashford collection housed in the Leeds City Museum. This record still however leaves the possibility, however small, that *T. costulata* may also occur in Went Vale, perhaps in a holocene deposit which would account for the strange mixture of Vertiginids recorded by Ashford. No specimens of *T. callicratis britannica* have ever been confirmed as occurring in Yorkshire.

The find by Lloyd-Evans in September 1975 was useful in that it gave us a modern example to examine, and an opportunity to record the other species found in association. Only one Vertiginid was found in the same habitat and that was *V. pygmaea*, although *Columella edentula sensu stricto* did occur in the woods a short distance away. None of the other *Vertigo* listed by Ashford could be found.

Pontefract

Jeffreys in British Conchology (1862-9) gives Pontefract as a second Yorkshire locality, the specimens having been recorded by R. Howes on Magnesian Limestone. A note in the record books of the Yorkshire Conchological Society states that this locality is believed to be the same as the Went Vale locality. There is also a record quoted as Wakefield which is unquestionably the same as that recorded by R. Howse.

Vice-county 64, Yorks, Mid-west
Gisburn (SD(34) 84)
Recorded (Booth 1921) as found at Gisburn in 1896 by F. C. Long, but not found since. No further information can be traced.

Vice-county 65, Yorks, North-west
Easby Abbey, Richmond (NZ(45) 1800)
Two specimens in the collection of Baker Hudson housed in the Dorman Museum, Middlesborough, have recently been noted and confirmed as *T. cylindrica*, (J. Conch. **28** (1974): 258). These specimens are labelled *V. minutissima*, but had never been reported to any recorder. Collected from the grounds of Easby Abbey in 1883, they are the only known specimens from North-west Yorkshire.

ACKNOWLEDGEMENTS
I would like to thank Dr. L. Lloyd-Evans, without whose help and kindness this paper could never have been written, and Dr. M. P. Kerney for his notes and observations on the original draft.

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ENTOMOLOGICAL REPORTS FOR 1974

Hymenoptera (H. E. and J. H. Flint)
A successful season and a widening of interests has produced a considerable number of records during the year from which the most notable are selected below. They include eight (†) not previously reported from Yorkshire. Mr. J. T. Burn has in preparation, for publication in this journal, an account of aculeate Hymenoptera taken in the Doncaster area based on a great deal of collecting in sandy situations. It includes a number of species not previously taken in the county and these records will not be repeated in the Annual Report. Notes have been received from Mr. M. E. Archer and Mr. P. Skidmore to whom our thanks are due. New county and vice-county records are denoted by the symbols † and * respectively.

SYMPHYTA
**Abia candens* Kon. (62) Ashberry Pastures, 1/7/73; J.H.F.
†*Melisandra cinereipes* F. (62) Strensall, 27/4/68; H.E.F. (det. J.H.F.).
**Loderus eversmanni* Kby. (64) Pool Bridge, 11/5/74; H.E.F.
**Allantus truncatus* Klug (62) Strensall Common, 9/6/68; H.E.F. (det. J.H.F.).
**Eutomostethus ephippium* Panz. (65) Reeth, 19/5/74; H.E.F. (det. J.H.F.).
†*E. gagathinus* Klug (64) Askham Bog, 16/6/74; J.H.F. Harewood Bridge, 13/7/74; H.E.F.
**Monophadnoides puncticeps* Kon. (62) Ellerburn Bank, 31/3/74; Riccaldale, 10/4/74; H.E.F.
**Pachyprotasis variegata* Fall. (62) Ashberry Pastures, bred from larva taken on 9/9/72; H.E.F.

**Phyllocolpa leucaspis* Tisch. (63) Wharncliffe Woods, 26/5/74; H.E.F. (det. J.H.F.).
**Nematus bergmanni* Dahl. (61) Skipwith Common, bred from larvae taken 21/10/72; H.E.F.
†*Pachynematus moerens* Först. (62) Scawton Moor, 9/4/74; Riccaldale, 10/4/74; J.H.F. (63) Bentley Tilts, a female, 9/5/74; P.S.

CYNIPOIDEA

†*Periclistus brandtii* Ratze. (63) Sykehouse area (SE 608139), 11/6/74; P.S.
†*Synergus evanescens* Mayr. (63) Sykehouse (as above), 11/6/74; P.S.
†*S. nervosus* Hart. (63) Sykehouse (as above), 11/6/74; Cusworth Park, at light, 13/7/74; P.S.

ACULEATA

**Notozus constrictus* Först. (62) Strensall, 11/7/71; M.E.A.
**Pompilus unguicularis* Thoms. (61) Allerthorpe, a female, 28/8/72; M.E.A.
**Crossocerus varius* Lep. (65) West Scrafton, 20/7/74; J.H.F.
**Panurgus banksianus* Kby. (61) Allerthorpe, a male, 15/6/74; M.E.A.
†*Nomada hirtipes* Perez (61) Allerthorpe, a female, 15/6/74; M.E.A.
N. tormentillae Alfk. (61) Allerthorpe, 30/6/73; M.E.A. (*62) Strensall Common, 18/7/71; J.H.F.
Coelioxys inermis Kby. (62) Heworth, York, a female, 15/6/73; M.E.A.
**Osmia leaniana* Kby. (62) Sand Hutton, a female, 2/7/71; M.E.A.

Lepidoptera (S. M. Jackson)

The past season has been rather a poor one due mainly to the cool, wet summer and, unlike last year, has been a very poor one for migrants. With few exceptions the butterflies were below par. The following have all contributed notes from which the more important extractions have been made: H.E.Beaumont, K.Garsed, N.Gill, F.Harrison, C.R.Haxby, R.J.Heppenstall, A.M.R.Heron, W.Jagger, P.Kendall, C.Mills, J.D.Pickup, F.Snookes, B.R.Spence and P.Q.Winter.

Euchloe cardamines L. (Orange Tip) (63) Castleford area, plentiful, 1974; J.D.P.

Gonepteryx rhamni L. (Brimstone) (61) Cottingham, one in greenhouse, 15/9/74; C.M. (63) Potteric Carr, 14/8/73; R.J.H. (64) Stainforth, two, 25/5/74; (M.S.Lockwood) S.M.J.

Argynnis selene Schiff. (Small Pearl-bordered Fritillary) (62) At a time when all the Fritillaries seem to be on the decline, I was pleased to see a few in its old established Gundale locality, 15/6/74; S.M.J.

Maniola tithonus L. (Gatekeeper) (61) Hotham, and near canal in same district, common 8/74; C.M. and S.M.J. (63) Potteric Carr, 8/74; R.J.H. (64) Barlow, 29/7/74 and 2/8/74; S.M.J.

Lycaena phlaeas L. (Small Copper) Apparently a poor year for this species with very few reports.

Acherontia atropos L. (Death's-head Hawk) (63) Crofton, Wakefield, resting on street lamp, 20/6/74; (F.I.Hodgson) C.R.H. This is the specimen to which reference was made in the B.B.C. "Wildlife" programme, 12/8/74, and is the only record for the year.

Celerio galii Rott. (Bedstraw Hawk) Several moths were bred out by subscribers from larvae obtained last year. (See Annual Report 1973, p. 22.) No records have been received this year for either moths or larvae.

Deilephila porcellus L. (Small Elephant Hawk) (62) Snainton, 7/74; (P. Ingham) P.Q.W.

Lasiocampa quercus callunae Palmer (Northern Eggar) (63) Harden Moor, Bingley, larvae in large numbers, 7/74. Apparently in fewer numbers on Rombalds Moor, C.R.H.

Drepana lacertinaria L. (Scalloped Hook-tip) (62) Newtondale, 16/8/74; A.M.R.H. and P.Q.W. (63) Thorne Moor, 27/7/74; F.H. (See also Annual Report 1973, p. 22.)

Apatele tridens Schiff. (Dark Dagger) (61) Muston, larvae on sloe, 13/10/74; P.Q.W. (63) Potteric Carr, larvae, 1973; R.J.H.

Spaelotis ravida Hubn. (Stout Dart) (63) Adwick-le-Street, two, 25/8/74; H.E.B.

Triphaena interjecta Hubn. (Least Yellow Underwing) (63) Pollington, 14/8/74; P.K. Potteric Carr, 17/8/74; R.J.H.

Anaplectoides prasina F. (Green Arches) (64) Malham Tarn, 6/74; C.R.H. (per J.B.).

Hadena bombycina Hufn. (Glaucous Shears) (64) Rombalds Moor, in large numbers, 5/74; P. Brown) C.R.H.

Eremobia ochroleuca Esp. (Dusky Sallow) (63) Pollington, two, 23/8/74; P.K. West Melton, 21/8/74; H.E.B. Potteric Carr, 9 and 18/8/74; R.J.H. (See also Annual Report 1973, p. 23.)

Brachionycha sphinx Hubn. (Sprawler) (62) Wass, 3/11/74; A.M.R.H.

Hydraecia petasitis Doubl. (Butterbur) (63) Bretton Park, larvae, 1974; N.G.

Zenobia subtusa F. (Olive) (63) Emley, 28/8/73; Lepton, 26/7/74; N.G. West Melton, 21/8/74; H.E.B.

Orthosia populeti Treits. (Lead-coloured Drab) (62) Wass, a few, 17/4/74; A.M.R.H. A new locality for this very local species.

Lithomoia solidaginis Hubn. (Bilberry Brindle) (63) West Melton, 4/9/74; H.E.B.

Pyrrhia umbra Hufn. (Bordered Sallow) (61) Kiplingcotes, larvae, 8/74; Muston, 29/6/74; P.Q.W. (64) Sherburn Willows, larvae, 8/74; S.M.J. Not often seen in inland localities.

Catocala nupta L. (Red Underwing) (61) Muston, one found resting on house wall, 9/9/74; P.Q.W. First record for many years.

Lygephila pastinum Treits. (Blackneck) (63) Potteric Carr, 12/7/74; R.J.H. Although this species is noted most years in various eastern parts of the county, this is the first record for very many years from the Doncaster area.

Sterrha emarginata L. (Small Scallop) (62) Strensall, 26/7/74; S.M.J. More common than usual in this, its only known Yorkshire locality.

Scopula imitaria Hubn. (Small Blood-vein) (63) Thorne Moor, 27/7/74; F.H. Pollington, 7/74; P.K. Potteric Carr, 26/7/74; R.J.H.

Cosymbia albipunctata Hufn. (Birch Mocha) (62) Langdale End, larvae, 1/9/74; P.Q.W. A new locality, previously recorded only from our three well-worked Commons.

Calocalpe undulata L. (Scallop Shell) (63) Thorne Moor, 27/7/74; F.H. Not met with for very many years and so one of the most important records of this report.

Philereme vetulata Schiff. (Brown Scallop) (61) Near Stamford Bridge, a few larvae, 1/6/74; S.M.J. An elusive species, not often reported.

Chloroclysta miata L. (Autumn Green Carpet) (62) Wass, 8/10/74; A.M.R.H.

Xanthorhoe spadicearia Schiff. (Red Twin-spot Carpet) (62) Gundale, 16/8/74; S.M.J. and W.J. Wass, several 25/5/74 onwards; A.M.R.H.

Colostygia salicata Hubn. (Striped Twin-spot Carpet) (62) Wass, 18/6/74; A.M.R.H. The first record from the north east for many years. Always local.

Lyncometra ocellata L. (Purple Bar) (63) Birkenshaw, Bradford, 1974; W.J. Rather scarce in the industrial areas.

Eupithecia virgaureata Doubl. (Goldenrod Pug) (63) West Melton, both broods appeared from 5/74 to 8/74; H.E.B. (64) Barlow, 8/8/74; S.M.J.

E. palustraria Doubl. (Marsh Pug) (64) Barlow, 30/5/74; S.M.J. (See also Annual Report 1973, p. 23.)

E. exiguata Hubn. (Mottled Pug) (61) Muston, several, 7/74; P.Q.W. The first record for this district.

Gymnoscelis pumilata Hubn. (Double-striped Pug) (61) Muston, 27/7/74; P.Q.W. Rather local.

Dyscia fagaria Thunb. (Grey Scalloped Bar) (62) Wass, 10/6/74; A.M.R.H. Although not uncommon, this species is rarely reported.

Anagoga pulveraria L. (Barred Umber) (62) Hackness, larvae, 25/8/74; P.Q.W. Wass, 23/5/74 and 17/6/74; A.M.R.H.

Ennomos quercinaria Hufn. (August Thorn) (61) Muston, one, 23/9/74; P.Q.W.

Lycia hirtaria Clerck (Brindled Beauty) (61) Kilnsea, 4/74; B.R.S. The first record in the county for over 70 years.

Hemerophila abruptaria Thunb. (Waved Umber) (62) Wass, 27 and 28/5/74; A.M.R.H. Very important records. Only a very few odd captures have been made in recent years. (See also Annual Report 1973, p. 23.)

Hemiptera (R. Crossley)

Preoccupation with other groups of insects during 1974 has meant that less attention has been given to the Hemiptera than for several years and this reduction in activity is reflected in the list which follows.

Three records are particularly noteworthy, these being *Troilus luridus* (Fab.) which is a large and handsome shield bug that cannot have been easily overlooked in the past, and two capsid bugs, *Sthenarus roseri* (Herrich-Schaeffer) and *Amblytylus nasutus* (Kirschbaum), both of which have a markedly southern distribution in Britain. Mr. Flint's discovery of several specimens of the local and rare bug *Lamproplax picea* (Flor) at Allerthorpe Common is remarkable in that this is the second V.C.61 locality at which the species has been discovered in recent years, the only previous Yorkshire record being from the Scarborough district in the last century.

The records which follow are those of Mr. J. H. Flint, Dr. L. Lloyd-Evans, Mr. P. Skidmore and the writer. New county and vice-county records are denoted by the symbols † and * respectively.

HETEROPTERA

†*Troilus luridus* (Fab.) (61) Skipwith Common, -/9/74; D.Horne, det. J.H.F.

Rhacognathus punctatus (L.) (61) Skipwith Common, -/9/74; D.Horne, det. J.H.F.

Lamproplax picea (Flor) (61) Allerthorpe Common, 9/11/74; J.H.F.

**Orius minutus* (L.) (63) Fishlake, 28/7/74; L.Ll-E., det. B.S.Nau.

†*Amblytylus nasutus* (Kirschbaum) (63) Woodlands, Doncaster, 6/7/74; Wadworth Wood, Doncaster, 16/7/74; Doncaster Museum, at light, 26/7/74; P.S.

†*Sthenarus roseri* (Herrich-Schaeffer) (63) Fishlake, 28/7/74; L.Ll-E., det. B.S.Nau, *teste* J.H.F.

**Orthotylus virescens* (D. & S.) (61) Allerthorpe Common, 15/9/73; R.C.

**Lygocoris spinolai* (Meyer-Dür) (63) Armthorpe, Doncaster, 6/8/66; Doncaster Museum, at light, 31/7/74; P.S.

**Phytocoris varipes* Boh. (64) Sherburn Willows, 24/8/74; J.H.F.

**Sigara limitata* (Fieb.) (63) Fishlake, 28/7/74; L.Ll-E., det. B.S.Nau.

HOMOPTERA

Macrosteles frontalis Fieb. (64) Roecliffe brick pits, 29/6/74; J.H.F.

†*Eupteryx origani* Zakh. (64) Thorpe Arch, three ex. *Origanum vulgare* on old railway line, 16/7/74; J.H.F. Added to the British List on 3/7/74 by Le Quesne, W.J., 1974, *Entomologist's mon. Mag.*, **109**, 203-206.

Chloriona unicolor H.S. (64) Askham Bog, by sweeping reeds, 16/6/74; J.H.F. The second record for the County.

†*C. glaucescens* Fieb. (61) Kilnsea, by sweeping *phragmites*, 24/7/74; J.H.F.

**Delphacodes exigua* Boh. (63) Upper Don Valley, near Wortley, 27/5/74, on short, dry grassland; J.H.F.

Criomorphus moestus Boh. (62) Stape, wooded hillside, 22/6/74; J.H.F.

Diptera (P. Skidmore)

So far as Diptera recording is concerned, 1974 was the most successful on record for Yorkshire: an additional 110 county (listed below) and 98 vice-county records of overlooked, common and rare species have been assembled. Several interesting species, e.g. *Telmatoscopus tristis*, *Forcipomyia pulchrithorax* and *Dasyhelea flaviventris*, have been bred from sap runs by the writer.

In May 1974 the Doncaster Museum started to run a light trap on a regular basis. Generally this was placed on the roof of the Museum but on one or two occasions Mr. J. W.

Hartley kindly transported the trap to other sites around Doncaster (i.e. Sandall Beat Wood, Cusworth Park and Low Farm, Armthorpe). One of the most interesting results of this project was the rather large percentage of trapped species thought to be primarily coastal or estuarine in distribution.

I should like to thank Messrs. W. Bunting, J. T. Burn, W. Davison, C. J. Devlin, J. H. Flint, T. H. Ford, C. A. Howes, J. W. Hartley and B. Spence for their help in Diptera recording, and Mr. E. C. M. D'Assis-Fonseca who kindly determined two of the species of Dolichopodidae. Unless otherwise stated, the county records listed below are those of the writer.

Mycetobia pallipes Mg. (63) Owston Park, reared from pupae found in quantity in sap run on old Horse Chestnut on 22/5/74, emerging from 30/5/74. Pupae also found in sap run on Elm *(Ulmus procera)* at Crookhill Park on 27/6/74, emerging on 3/7/74. This typical sap run fly is well known from Lancs. and Notts. southwards.

Clytocerus ocellaris (Mg.) (63) Castle Hills, 16/5/74. A very conspicuous moth fly.

Telmatoscopus tristis (Mg.) (63) Cantley Park, a single specimen apparently agreeing with this species in Coe *et al.* (1950) was reared from debris from a very small sap run in a Yellow Chestnut *(Aesculus octandra)*, emerging on 30/5/74. Coe *et al.* give only one locality in Britain, the New Forest.

Procladius rufovittatus (van der Wulp) (63) At light, Low Farm, 29/6/74.

Cricotopus obtexens (Walker) v. inserpens Walker (63) At light, Doncaster Museum, 20/6, 30/6; Sandall Beat, 21(6; Low Farm, 29/6/74.

C. vitripennis (Mg.) *v. halophilus* Kiffer (63) At light, Sandall Beat, 21/6; Low Farm, 29/6; Doncaster Museum, 30/6, 1/7/74.

Tanytarsus (Cladotanytarsus) atridorsum (Kieffer) (63) At light, Sandall Beat, 21/6/74.

Forcipomyia brevipennis (Macquart) (63) At light, Doncaster Museum, 16/6, 26/7, 30/7, 31/7/74.

F. ciliata (Winnertz) (63) At light, Doncaster Museum, 20/6, 31/7, 21/8, 16/9; Sandall Beat, 21/6/74.

F. papilionivora Edw. (63) Hatfield Lings, 28/6/74, J.T.Burn; attached to wing veins of *Chrysopa.* The specimens run down in Edwards (1926) to this species but the scutellum is concolourous with the dorsum.

F. pulchrithorax Edw. (63) Cantley Park, many specimens of this very striking species emerged from the rot hole debris from the *Aesculus octandra* mentioned under *Telmatoscopus tristis* above.

F. radicicola Edw. (63) At light, Doncaster Museum, 31/7, 21/8/74.

Atrichopogen lucorum (Mg.) (63) At light, Sandall Beat, 5/7/74. The examples taken run down in Edwards to this but have legs pale in both sexes.

Dasyhelea dufouri (Lab.) (63) Owston Park, bred in quantity from sap run in old Horse Chestnut mentioned under *Mycetobia* above, emerging from 30/5/74. Also at light, Doncaster Museum, 19/6, 5/8, 21/8; Sandall Beat, 6/7; Cusworth Park, 12/7/74. Mainly known from sap runs.

D. flaviventris Goet. (63) Crookhill Park, two emerged from sap run debris from elm mentioned earlier, on 28/6/74.

Culicoides cubitalis Edw. (63) At light, Sandall Beat, 21/6, 6/7/74.

C. halophilus Kieffer (63) At light, Sandall Beat, 21/6, 6/7/74.

C. maritimus Kieffer (63) At light, Sandall Beat, 21/6, 5/7/74; Low Farm, 29/6/74.

C. nubeculosus (Mg.) (63) At light, Sandall Beat, 5/7/74.

C. odibilis Austen (63) At light, Sandall Beat, 21/6, 6/7; Cusworth Park, 28/6; Low Farm, 29/6/74.

C. salinarius Kieffer (63) At light, Doncaster Museum, 16/6; 21/8; Low Farm, 29/6/74.

Bezzia albipes (Winnertz) (63) At light, Doncaster Museum, 7/7/74.

B. ornata (Mg.) (63) At light, Sandall Beat, 5/7/74.

Ectaetia clavipes (Lw.) (63) Sykehouse area (SE 616155), 11/6/74. According to Edwards a rare species.

Epidapus atomarius (DeGeer) (63) Bentley Common, 1/5/74, by sieving *Phalaris* by a fishpond.

Harmandia globuli (Ruebs.) (63) Wadworth Wood, galls on *Populus tremula*, 18/7/74.

Nemotelus pantherinus (L.) (61) Kilnsea, 24/7/74, J.H.Flint.

Crossopalpus humilis Frey (63) Bentley Tilts, 9/5; Norton Common, 11/6/74

C. nigritellus (Zett.) (63) Bentley Tilts, 9/5.74.

Tachydromia claranda Collin (63) Back Wood (Bessacarr Warren), 11/7/74.

T. exilis (Mg.) (63) At light, Sandall Beat, 21/6, 6/7/74.

T. extricata (Collin) (63) At light, Sandall Beat, 21/6, Doncaster Museum, 31/7; also by sweeping at Back Wood, 11/7/74.

T. optiva Collin (63) Wadworth Wood, 18/7/74.

Sicodus connexus (Mg.) (64) Strid, Wharfedale, 30/6/73.

Euthyneura myrtilli Macquart (63) Wentworth Park, 25/5/74.

Hilara clypeata Mg. (63) Owston Park, 22/5/74.

H. fulvibarba Strobl (63) Auckley Common, 20/6/74.

H. hirtipes Collin (63) Owston Park, 22/5/74.

H. nigrina Fallen (63) Castle Hills, 9/7/74.

Empis nigripes F. (63) Wentworth Park, 25/5/74; Norton Common and Sykehouse areas, 11/6/74.

Rhamphomyia crassirostris Fallen (63) Wentworth Park, 25/5/74.

Hemerodromia raptoria Mg. (63) Bentley Common, 19/6/74.

Medeterus diadema (L.) (63) Hatfield Lings, 13/7/74, J.T.Burn; on trunks of conifers. A very interesting discovery of this large, mainly E. Anglian species.

Atelestes pulicarius (Fallen) (63) Crookhill Park, 27/6/74.

Pipunculus zugmayeriae Kowarz (63) Wadworth Wood, 18/7/74.

Helophilus lunulatus (Mg.) (64) Roecliffe Brickpits, 29/6/74; J.H.Flint.

Myopa vicaria Walker (61) Skipwith Common, 4/74, J.H.Flint. (63) Holme House nr. Armthorpe, 5/71, J.T.Burn. This last record was published (YNU Annual Report for 1971) under the name *M. strandi* Duda. The writer was not happy with this identification and showed the specimen, along with the Skipwith example, to Mr. K. G. V. Smith of the British Museum who expressed the opinion that they were both this extremely rare species. He knew of only two specimens: one in the foreign collection at the British Museum and the other, the only known British specimen from Barton Mills (Suffolk) is in the Collin collection at the Hope Department of Entomology (Oxford). *M. strandi* is rare though widespread throughout the southern half of England. The Hatfield Lings specimen of *M. vicaria* was donated to the British Museum.

Oxyna flavipennis (Lw.) sensu Seguy (63) Denaby Ings and Wilthorpe, 1967; Norton Common, 11/6/74; Bentley Common, 19/6/74.

Lyciella affinis (Zett.) (63) Owston Park, 22/6/74.

Sapromyza hyalinaka (63) Wentworth Park, 25/5/74.

Calliopum simillimum Collin (63) Auckley Common, 20/6/74.

Psilosoma lefebvrei (Zett.) (63) Edlington Wood, 8/8/71; Denaby Ings, 24/8/74.

Psila merdaria Collin (63) Radcliffe Moat (near Bentley), 16/5; Owston Park, 22/5; Wentworth Park, 25/5; Norton Common, 11/6/74.

Colobaea bifasciella (Fallen) (63) Blacktoft Sands, one emerged from a *Lymnaea truncatula*, the only known host of this species, collected in January, 1974; the fly emerged on 19/5/74.

Tephrochlamys flavipes (Zett.) (63) Hurst Wood (near Rossington Bridge), 1/7; Hatfield Lings, 2/11/73.

Notiphila annulipes Stenh. (63) At light, Low Farm, 29/6/74.

Philygria flavipes (Fallen) (63) At light, Low Farm, 29/6/74.

Hyadina humeralis Becker (63) Hatfleid Lings, 2/11/73.

H. nitida (Macquart) (63) Bentley Common, 19/6/74.

Ephydra micans Haliday (63) Low Farm, at light, 29/6/74.

Scatella silacea Lw. (63) At light, Sandall Beat, 6/7; Doncaster Museum, 16/9/74.

S. subguttata (Mg.) (63) At light, Doncaster Museum, 16/6; Low Farm, 29/6; Sandall Beat, 6/7/74.

Sphaerocera paracrenata Duda (63) Wentworth Park, 25/5/74.

S. monilis Haliday (63) Crowle Brickyards, 24/1/73; Barnsdale, 4/6/74. According to the Watsonian system, the former locality is in Yorkshire (VC.63) though on Ordnance Survey Maps it is in Lincolnshire. Barnsdale is on the Permian south of Great Smeaton.

S. parapusilla Duda (63) Wentworth Park, 25/5/74; Doncaster Museum, at light, 31/7/74.

Borborillus uncinatus Duda (63) at light, Sandall Beat, 21/6, 4/7/74.

Trichiaspis similis Collin (63) Bentley Common, bred from horse dung, 4/74; also at light at Doncaster Museum, 14/7, 5/8; Sandall Beat, 21/6, 4/7/74. This is one of our commonest British flies, but it was not on the Yorkshire card index.

Limosina fuscipennis Haliday (61) Spurn, 18/8/74.

L. moesta Villeneuve (63) Hatfield Lings, 13/10/73.

L. pectinifera Villeneuve (63) Wentworth Park, 25/5/74.

Coprophila vagans (Haliday) (63) At light, Doncaster Museum, 20/6, 30/6, 2-6/7, 30/7, 5/8; Sandall Beat, 21/6, 4/7, 6/7; Low Farm, 29/6; Cusworth Park, 13/7/74.

Scaptomyza flava Fallen (63) At light, Doncaster Museum, 20/6, 16/9/74.

Drosophila andalusiaca Strobl (63) Low Farm, 12/3/66 Doncaster Museum, light, 30/6, 4/7, 26/7, 5/8, 21/8/74.

D. obscura Fallen (63) At light, Doncaster Museum, 16/9/74.

Agromyza flavipennis Hendel (63) Norton Common, 11/6/74. The specimen runs down to this in Spencer (1973), but species inadequately described in this work.

A. myosotidis Kalt. (63) Bentley, Common, 19/6/74.

Melanagromyza dettmeri Hering (63) Hatfield Lings, 25/6/74, J.T.Burn.

Lemurimyza dorsata Siebke (63) Cusworth Park, 25/6/74.

Liriomyza strigata Mg. (63) At light, Doncaster Museum, 23/7, 31/7/74.

Metopomyza flavonotata (Hal.) (63) Auckley Common, 20/6; Norton Common, 11/6/74.

Napomyza scrophulariae Spencer (63) Barnsdale, 4/6/74.

Phytomyza flavicornis Fallen (63) Wentworth Park, 25/5/74.

P. milii Kalt. (63) At light, Sandall Beat, 21/6/74.

P. nigritella Zett. (63) Back Wood (Bessacarr Warren), 11/7; Cusworth Park, 12/7/74.

P. ranunculi Schr. (63) At light, Doncaster Museum, 16/6, 16/9/74.

Cerodontha atronitens (Hend.) (63) Castle Hills, 9/7/74.

C. biseta (Hend.) (63) Castle Hills, 9/7; Cusworth Park, at light, 13/7/74.

Meoneura flavifacies Collin (63) at light, Low Farm, 29/6; Sandall Beat, 5/7/74. A minute though striking species.

Oscinosoma cognata (Mg.) (63) 16-Acre Plantation (near Owston), 4/5/73; Castle Hills, 16/5/74. The difference given to separate this species from *O. germanica* Duda by Collin (1946) are very unsatisfactory, as the "species" vary greatly.

Oscinella nitidissima Mg. (63) Bentley Common, 19/6/74.

O. pusilla (Mg.) (63) Norton Common, 11/6/74.

O. trochanterata Collin (63) Auckley Common, 20/6/74.

O. vastator Curtis (63) Wadworth Wood, 18/7/74.

Lasiosina cinctipes (Mg.) (63) Bentley Toll Bar, 9/5/74.

Chlorops laeta Mg. (sensu Seguy) (63) Crookhill Park, 27/6/74.

Pelatachina tibialis (Fallen) (64) Askham Bog, common, 16/6/74, T.H.Ford.

Frauenfeldia rubricosa Mg. (63) Rotherham, 19/7/73, T.H.Ford.

Sarcophaga haemorrhoa Mg. (63) Rotherham, 18/5/73, T.H.Ford.

S. nigriventris Mg. (61) Bridlington, frequent, 20/8/74, T.H.Ford.

S. offuscata Sch. (63) Rotherham, 29/9/73, T.H.Ford.

Lucilia silvarum Mg. (63) Rotherham, 6/8/74, T.H.Ford.

Phaonia cincta (Zett.) (63) Crookhill Park, reared from larva found in sap run on elm *(U. procera)* on 27/6, fly emerged on 12/7/74. According to Fonseca this species is recorded from Yorkshire but no record appears on the Yorkshire cards. The species is a characteristic sap run species of Elm and Horse Chestnut.

P. exoleta (Mg.) (64) Copgrove Park, 14/7/67. The writer admits to a *lapsus calami* in recording this as *P. trigonalis* Mg. a rare species though much less rare than *P. exoleta*. (YNU Annual Report for 1967, p. 17.) *P. exoleta* in the larval stage inhabits water holes in old trees where it preys upon other Dipterous larvae (Culicids, etc.). The previous most northerly record in Britain is an old record from Nottingham (L.W.Carr, 1935).

Spilogona biseriata Stein (61) Spurn, emerged on 28/8, from puparia found under mats of *Enteromorpha* lying on damp mud by "canal", on 18/8/74.

Lispe loewi Ringd. (61) Spurn, reared along with *Spilogona biseriata* from same material. (63) Denaby Ings, 26/8/67. The Spurn locality is absolutely typical for this fly; the Denaby Ings locality most surprising!

Pseudocoenosia solitaria (Zett.) (61) Skipwith Common, reared from larvae found in wet moss amongst *Calluna*, 6/67; (63) Blaxton Common, 29/6/67.

Lispocephala erythrocera (R.-D.) (63) Denaby Ings, 26/8/67; Bentley Common, 19/6/74, also taken by C.A.H. on 23/8/74.

Allognota agromyzina (Fallén) (63) Barnsdale, 4/6, Cusworth Park, 28/6/74.

Coenosia alleni Fonseca (64) Barden Bridge, near Bolton Abbey, 26/6/66, C.J.Devlin.

C. antennata (61) Spurn, 18/8/74.

BOOK REVIEW

The Naturalist in Britain by **David E. Allen.** Pp. xii + 292, 13 plates. Allen Lane, 1976. £9.00.

Personally, I find naturalists just as fascinating as natural history itself, but, to quote from the preface of this book, "natural history literature is of a kind from which it is peculiarly difficult to quarry 'social' detail". Our subject matter is all too often represented in published form as endless lists of records and formal scientific descriptions. Today, reports of field meetings lack the graphic and personal touches afforded them in the 19th century. In this way characterization can only be built up through personal contact ("Naturalists, it is true, are probably seldom created *ab initio* by teaching; but they are at least 'confirmed' by well-timed help and encouragement." p. 19), by word of mouth, or from more expansive obituary notices. The author's interpretation of early naturalists' correspondence (p. 21) is most perceptive and borne out by the reviewer's work on the letters of James Dalton now housed in the Brotherton Collection in the Leeds University Library.

The text is peppered throughout with references to naturalists born in, or closely connected with, Yorkshire: such worthies include James Bolton, Samuel Brewer, W. Eagle Clarke, John Cordeauz, W. Warde Fowler, Margaret Gatty, Thomas Johnson, William Newbould, W. H. Pearsall and H. Cotterill Watson, and 'a certain Dr. Younge" (p. 173) who is undoubtedly William Younge of Sheffield. There are also numerous references to Yorkshire natural history societies, including the Y.N.U., but it is unfortunate that the roles played by Yorkshire conchologists and mycologists, in establishing their subjects at national and international levels, have been omitted. On the other hand, it is pleasing to note the inclusion of E. Adrian Woodruffe-Peacock, a regular contributor to this journal at the turn of this century, who in my opinion deserves more national recognition as a pioneer in the ecological approach to natural history — a view also expressed by the late Sir Arthur Tansley.

We are indebted to David Allen for assembling this social history, albeit, to quote again the words of the author, it is "the piecing together of the living reality of the past from the merest unintended fragments" (p. 2). In fact, my only criticism of the book is that it only touches the surface: the text is for the most part anecdotal. At this price, one expects in-depth treatment. Nevertheless, the book contains extensive bibliographical material and is delightfully produced with photographic plates and text illustrations. It is thoroughly recommended for the library, and should be included in 'suggestions for purchase' if the librarian has passed this one by.

M.R.D.S.

FIELD NOTES

Crayfish eaten by Tawny Owl

Among a number of pellets collected at a roosting place of a pair of Tawny Owls *(Strix aluco* L.) in the Kentmere Valley, Cumbria, in May 1975, one differed markedly from the rest in being composed to a large extent of the remains of a Crayfish *(Austropotamobius pallipes* (Lereboulett)), a crustacean that occurs in the nearby stream. Like other manageable prey species this had evidently been swallowed whole, though neither of the two large chelipeds was present. From a relatively undamaged portion of the carapace and from the size of the thoracic limbs it was estimated to have had a length of about 8 cm.

Although fishes and amphibians have been recorded as prey of the Tawny Owl I have seen no report of the wholly aquatic Crayfish as such. One assumes that the victim had been taken from shallow water at the margin of the stream.

Geoffrey Fryer

Spoonbills at Fairburn Ings Nature Reserve during 1975

Prior to 1975, there had been seven records of Spoonbills, *Platalea leucorodia*, at Fairburn Ings, involving nine birds. These consisted of single birds on 9th May 1954, 6th June 1959, 25th May 1965, 30th June 1966, 9th and 10th April 1969, and 14th May 1970, and a party of three birds on 28th August 1963, the sightings mainly following periods of easterly winds.

During April 1975, a remarkable series of Spoonbill records were made at Fairburn, involving three single birds. The details of each record are set out below:

On 22nd April, while walking along the south side of the reserve, I noticed a large bird flying high to the east, about half a mile to the north. It gradually swung to the south, losing height as it did so, circled over the cut area, and then flew back to the west, appearing to land at Newton Ings. The bird was obviously a Spoonbill from its characteristic bill shape and its size. The presence of black tips to the primaries and pale bill and legs showed that the bird was in its first year (hatched in 1974). I immediately contacted C. Winn, and together we quickly searched the Newton area for the bird, without success. Later, after I had departed, the bird was seen for some time, and was finally watched flying high to the north.

The following morning, I observed a second Spoonbill circling high over the Main bay of the reserve, quickly gaining height. I could clearly see that this bird had very dark, or black legs and bill, and also that it had less black on the wing tips. Having gained a great height, it flew away to the south-west, not to be seen again that day.

On the afternoon of the 24th, I noticed another Spoonbill, flying west over the Main bay and rapidly losing height, as if about to land. When it dropped out of sight behind the spoil heaps, I quickly moved to a suitable vantage point, from where I could see the bird on New - ton Moat, feeding by sweeping its beak from side to side in shallow water. By the time I reached the Moat, the bird had joined two Grey Herons, *Ardea cinerea*, on a field, and was preening. It was in all respects an adult bird except that it had small black tips to the wings. It was seen to be colour ringed, with a yellow ring on the left leg, as well as having a metal ring on the right. The rings appeared as 'knees' at a distance or in flight, and served to distinguish the bird from that seen the previous day. This third bird gave excellent views to many observers until the morning of the 25th, when it flew away to the east. The combination of rings shows that the bird was ringed as a nestling at the Naardermer, Netherlands, in summer 1973. This bird, and also the one seen on the 23rd, were therefore in their second years.

Winds up to the 23rd April had been mainly south-westerly, but by the 24th were from the east. Other birds of Continental origin seen at Fairburn during the four day period included a White Wagtail, *Motacilla alba alba*, on the 23rd and a Red-crested Pochard, *Netta rufina*, the 26th. The above are the eighth, ninth, and tenth records of Spoonbills for Fairburn Ings. An adult bird seen on the 2nd August has now brought the total to eleven. Full descriptions of all four birds have been submitted to and accepted by the Y.N.U. Rarities Committee.

I am grateful to R. Hudson of the British Trust for Ornithology for kindly tracing the rings described above.

S. M. Lister

BOOK REVIEWS

The Dictionary of Butterflies and Moths in Colour by **Eric Laithwaite, Allan Watson** and **Paul E. S. Whalley.** (American consultant editor: W. Donald Duckworth.) Pp. xlvi & 296, with 13 text figures, including 144 pages displaying 405 colour plates. Michael Joseph. 1975. £12.50.

Let me make it clear immediately that this is a beautiful and desirable book, splendidly printed. It comprises three very different sections: an introductory essay, the colour plates, and the dictionary.

The essay is contributed by Eric Laithwaite, now justly famous not only for his advocacy of the linear induction motor, but latterly also for his televised presentations of science for young people. His ability to communicate his own enthusiasm is again evident here in relation to his lesser-known but equal passion for Lepidoptera. The result is a lively, entertaining and informative but undisciplined essay. The continual digressions tend to confuse, and may ultimately exhaust, the reader.

The plates, encompassing 1,000 species, are a mixture of photographs from life and arrangements of set specimens. It is a surprise to discover that the latter plates comprise only one quarter of the whole, for these, being more informative, tend to hold one's attention. The sequence is approximately systematic, though it seems that artistic considerations of colour balance have influenced the arrangement, for plates of birdwings face papilios, rather than being grouped together. The representation is decidedly unbalanced. Two-thirds (77) of the families of lepidoptera, the so-called 'micros', are quickly disposed of in 16 pages, and even of these the large 'micros' understandably have the lion's share. In contrast, the eight families of butterflies have 70 pages. There are over 100 plates of Nymphalidae alone, though their magnificence is such that it is churlish to complain. However, the 59 plates devoted to life photos of British butterflies (a mere 75 species, at the most generous count) is surely an excessive allotment, even though most of these are superb, for this field is already well covered. The plates bear no legend other than the name(s) of the species portrayed. Since on all of the pages a full length 40mm strip is reserved for legends, it is a pity it has not been put to more purpose. The reader is thus left to refer to the dictionary to find out what family or families are represented on a particular plate. For the most part, though an unnecessary inconvenience, this presents little difficulty, but there are several important exceptions! Since the Hypsidae form the meat of a sandwich with the Arctiidae, and this latter family is also in part mixed up with the Ctenuchidae, anyone not already entirely familiar with the composition of the Arctiidae will have to work hard to discover the limits of this versatile family. Furthermore, the reader must again have recourse to the dictionary, wherein the size of different species is given, sometimes as a range, sometimes not, in order to determine the scale of the plates. The scale of the life photographs is predictably very variable. A few (e.g. pl. 75), are grossly over-magnified. The scale of the plates of set insects, which could so easily have been indicated, matters much more. The small insects are in fact approximately life-size, but others are cunningly reduced to a degree (20-35% for the most part) that is not immediately obvious. However, some of the larger insects are cut down more drastically, resulting for instance in decidedly under-sized hawkmoths (pls. 342, 344), while the glorious birdwings on pl. 107 can be scarcely more than half-size, even allowing for the possibility that the authors have selected the smallest specimens available. The reader ought not to have to discover this for himself.

The dictionary is the least satisfactory part of the book, even though it is authoritatively written. Both authors are professional lepidopterists, colleagues at the British Museum. Their task was however impossible. By the very nature of the subject, within the confines of 150 pages, the dictionary had to be hopelessly incomplete. Brief vignettes, of rather uneven value, are provided for all the illustrated species, and an equal number that are not. Sometimes the authors only succeed in infuriating. They write of *Eterusia repleta* that it "should be compared with the related species *E. rajah*", although the latter species is not illustrated! Much precious space is wasted. Since English names are also included, there is no point at all in cross-referencing alphabetically all the specific names included in the

dictionary, since these never otherwise appear in the book except in association with their appropriate genus.

Some misprints are inevitable in a book of this complexity. *Callisthenia* for *Callithea* (pl. 229) is just the sort of error that a weary proof-reader may not spot, but surely someone should have noticed that pl. 172 is not *Coenonympha pamphilus*, but a species of *Erebia*!?

This is a fine book — the plates are indeed beautiful. But it could easily have been much better. If only the publishers had had the courage to allow the coffee-table book aspect of the sales prospects to look after itself, and permitted the authors to provide the truly systematic treatment for which there is a real need. As it is, this book is good enough to discourage anyone, for many years to come, from producing the book that this one ought to have been, but sadly isn't.

Doñana: Spain's Wildlife Wilderness by **Juan Antonio Fernandez.** Pp.256 with 144 colour photographs. Collins, 1975. £7.50.

The Coto Doñana has a long history. For centuries it was the hunting ground of kings and princes; now it is a wildlife reserve and perhaps the most important one in Europe. This superb collection of photographs gives a vivid impression of the enchantment and richness of interest of this great wilderness of pine woods, scrubland, dunes, marshes and lakes. It includes probably the finest colour photographs ever taken of lynx and imperial eagle. Other rarities are beautifully portrayed, indeed some of the pictures are breath-taking in their combination of artistry and technical skill with flawless colour rendering. But this is a coffee-table book rather than a treatise; the text is subsidiary to the splendid illustrations though it is informative in a discussive and anecdotal manner.

W.A.S.

Physiological aspects of deep sea biology by **A. G. Macdonald.** Pp. xiii + 450 with 212 text figures and 86 tables. Cambridge University Press, 1975. £18.50

The deep sea is perhaps the most fascinating of all habitats, because it is the least accessible. Relatively few biologists have the opportunity even to trawl or dredge specimens from the depths and very few indeed have actually visited them. Murray and Hjort's *The depths of the ocean* (1912) and Marshall's *Aspects of deep sea biology* (1954) have long been popular, but a great deal has been discovered since they were written. Dr. Macdonald's new book will be widely welcomed.

This book is mainly about the physiology of deep sea life so readers looking for pictures of strange creatures had better look elsewhere. A large section of the book is concerned with the biochemical and physiological effects of high pressures. The researches of Dr. Macdonald and others in this field have yielded a lot of information which helps us to understand the depth ranges of animals, but they do not make exciting reading for the non-specialist because they do not lead to broad generalizations. Other chapters deal with a wide range of topics which I personally find more interesting: vision and bioluminescence in the dark depths, deep sea sounds, buoyancy, the biomass of deep sea organisms, and so on. The final chapter explains the physiological problems of deep diving and describes the apparatus of deep sea research from small pressure vessels to research submarines.

Remarkably little is omitted from this book, so it will be very useful as a reference book. The inevitable consequence is that some explanations are cut short for lack of space and this will be regretted by general readers.

R.McN.A.

A Dictionary of Entomology by **A. W. Leftwich.** Pp. 360. Constable, London. 1976. £6.50.
A. W. Leftwich has compiled some 5,000 definitions of entomological names and terms in the 360 pages of this new dictionary, which forms a companion volume to his earlier Dictionary of Zoology. Aimed primarily at amateur entomologists, naturalists, and students of zoology, the book provides clear and concise introductions to a wide range of entomological topics, with entries varying in length from 4 to 350 words.

The insect orders and their principal families are described by an outline of their morphology, principal foods and habitat. At the end of the book there is a useful seven-page summary of insect classification.

Information on the size, colouration, geographic distribution, feeding habits and economic importance of a number of selected genera and species is included. The selection of species shows a definite, but understandable bias towards British and West European examples, but important or well-known species from other parts of the world do appear. Most of the species are described under their English names, with a cross-reference under the generic or specific binomial.

There is a comprehensive selection of anatomical and morphological definitions, and a useful set of rather longer sections on the main physiological processes in insects (excretion, reproductive capacity, nervous system, respiration, and so on). Insect behaviour receives attention, but there are some odd omissions. Taxis is defined, for example, but there is no entry of kinesis; migration is described at length but there is no entry for dispersal. There is a useful entry under 'direction finding'.

Ecology is not itself defined, but many terms of ecological importance do appear, such as predatory insects, biotic potential and disease-transmission (although 'vector' is not defined). Terminology from modern insect ecology is not included, and the mysteries of terms like life-table, key factor, density dependence and functional response are not revealed. Life cycle information is well covered, but nothing is to be found on host-plant alternation in aphids, or on host-specificity in parasites and parasitoids.

Applied entomology is covered by entries on most of the world's major pest and disease-transmitting species, but there is little information on beneficial insect activities such as pollination and natural control. Biological control is defined, and most of the successful cases are recorded, but nothing is said on insecticides, or on other methods of pest control.

There are few unnecessary or ill-chosen entries, but a few are somewhat bizarre, such as no-see-um, apparently an American colloquialism for small, biting midges.

Overall, this is an admirable dictionary for its purpose, and is warmly recommended. It is clearly written, well laid out, concentrates for the most part on important terms, and suffers few telling omissions. It is a mine of information, and would keep most naturalists engrossed for hours of browsing. It is easy and quick to use as a source of reference. Like many modern books, its price may deter those who would most benefit from owning the book, like the young naturalist, or the student of zoology or ecology, but nevertheless the dictionary will form a useful addition to the libraries of amateur and professional entomologists alike.

M.J.C.

Birds of Britain and Europe by **Dennis Avon** and **Tony Tilford**. Pp.176 with 133 colour photographs. Blandford Press, 1975. £3.25.

So many good bird books are now available that the production of yet another one might seem superfluous. No justification is required however for the publication of these pictures, for they combine the highest standards of colour photography with equally high quality colour printing. The illustrations are quite superb and the accompanying text and distribution maps are always arranged adjacent to the photographs. One hundred species are depicted and any disappointments are more likely to centre around omissions from, rather than with the contents of, this book.

The Naturalist on the River Amazon by **Henry Walter Bates.** Pp. 394 with 39 illustrations. Constable & Co. £3.20.

This edition of one of the great classics of natural history is a welcome addition to the Dover series of works on travel and exploration. Bates' work was first published in 1863 and for more than a century it has given pleasure to countless readers. His descriptions of the teeming wild life of the Brazilian forests are vivid and delightful for he was a brilliant writer as well as an acutely observant and painstaking naturalist. Eleven years of travel — most of it without any white companion — during which he collected nearly 15,000 species, more than half of them new to science, was alone a remarkable achievement; the fact that he allowed no obstacles, hazards or hardships to deter him is a measure of his dedication combined with his tolerance, patience and ability to adjust to the feckless and indolent life of the tribes amongst which he travelled. He never seeks to impress by dramatising the perils he encountered or complain of the hardships he underwent or the frustrations he had to endure, for these are irrelevant to his interests and to his purpose of describing the country and its wild life.

Peter Fleming once said of this book that it was written in a "prose as durable, as well-proportioned and as polished as a Victorian sideboard . . . Brave men, learned men, eccentric men, with the aid of helicopters, out-board motors and other sophisticated equipment, are still quarrying for fresh knowledge of these vast regions; but whether any of them will do one-tenth of what Bates did or whether any of the books they write will have a life a tenth as long as his seems to me doubtful in the extreme."

W.A.S.

The Oxford Book of Trees by **A. R. Clapham** and **B. E. Nicholson**. Pp. 216 with 96 full page colour plates. Oxford University Press, 1975. £4.95.

The first part of this addition to the Oxford Series on plants and animals consists of descriptive accounts of native British trees and shrubs accompanied by detailed illustrations of leaves, flowers, fruit and bark. Then follow a series of landscape pictures of different kinds of British woodlands. Eleven types are distinguished, their ecology, distribution and history being described by Professor Clapham. The second part of the book covers conifers and the introduced broadleaved trees of parks and gardens. Keys are included for the identification of conifer genera and the cultivated species of the more important genera. In all over 350 species of trees and shrubs are included and more than 250 are illustrated by Barbara Nicholson's admirable paintings.

W.A.S.

The Environment of Early Man in the British Isles by **John G. Evans.** Pp. xvi + 216. Paul Elek, London. 1975. £5.00.

The advancement of knowledge, and spread of interest, in environmental archaeology in the past decade has unfortunately not been matched by an output of suitable publications. Only a handful of works on the subject is to be found on the archaeologist's bookshelf, and there has been little attempt to popularize this important line of archaeological enquiry; *The Environment of Early Man in the British Isles* fulfils both these needs.

The author describes the developmental changes of the British prehistoric landscape in respect of the many physical and biotic factors acting upon it, and shows in particular the interaction of man and his environment from the Lower Palaeolithic to Roman period. A further chapter is devoted to the historical period, with attention paid to the impact of agricultural practices in more recent times. The text is most ably supported by numerous tabulations, 79 line drawings and 12 half-tone plates, together with detailed notes, bibliography and index. Both author and publisher are to be congratulated on the scholarship and presentation of this most timely book.

M.R.D.S.

Pathway to the Wild by **William Condry**. Pp.208 with 16 plates. Faber and Faber, 1975. £5.50.

William Condry details the story of his involvement in conservation from the time of his occupation of the house by the marsh, Ynys Edwin, to the present time. The marsh is Ynis Hir, in Wales, an RSPB reserve of which he is the warden. He describes holidays in the Engadine, Clare, Africa, Scotland and Andalusia, but the meat of the book is his description of the wild life and the countryside of Wales. Conservation is his consuming passion as readers of his "Country Diary" in *The Guardian* realise. The most important chapter, on the birth of the bird reserve, gives an interesting and full account of the problems of reserve management and should be read by all who have responsibility for reserves. He states that a reserve should have one third open for controlled visiting, one third visited by the warden and staff and one third scarcely ever visited so that the plants and animals find true sanctuary. It is of interest to Yorkshire naturalists that he specially commends Colt Park Wood National Nature Reserve, which he describes as a "delicious reserve", and an "oasis in the ever-nibbled sheep lands".

The author's favourite quotation is from Thoreau "We need the tonic of wilderness", and he emphasises that this applies as much to the small facets of conservation such as the preservation of a short length of hedge, a single bush or a tiny pool, as to the larger areas.

This is an informative and attractive book, which is enhanced by excellent illustrations.

J.D.P.

Down to Earth Gardening by **Lawrence D. Hills**. Pp. 304 with 16 plates, 20 text figures and 5 plans. Faber and Faber, paperback edition, 1975. £2.00.

This book, originally published in 1967 is, like its title, thoroughly down to earth. An unusually large amount of information and advice is packed into its 304 pages by an author who knows what he is talking about. Discussion of method includes both practical and aesthetic aspects and the reader is introduced to a wide range of plants. The style is conversational rather than "text-book" but an index is provided which would help one to trace the subjects discussed. One of the few things about which a reviewer could complain is the extremely limited and invidious selection of suppliers.

T.S.C.

Archaeological Sediments by **Myra L. Shackley**. Pp. x + 159. Butterworths, 1975. £8.00.

The importance of pedology and sedimentology to the archaeologist in his interpretation of excavations has been more fully realized in recent years. This book will therefore be welcomed: the author is to be congratulated on her lucid description of a wide range of analytical methods. Both students and teachers in upper secondary schools, colleges and universities will benefit from this book, and find the techniques described of value not only in the field of archaeology, but also in geographical, environmental and biological studies. Techniques involving both simple and sophisticated apparatus are elucidated: field recording, sampling, chemical and physical analyses, and optical instrumentation are covered in this way.

The book is attractively produced: the text is supplemented throughout by plates, diagrams and tables, and each chapter is supported by a comprehensive reference list.

It is a great pity that the price of this work will deter many individual purchasers, and it is hoped that the publishers will consider issuing a paper-back edition suitable for the student working in the laboratory. Nevertheless, libraries are strongly recommended to acquire this publication which will clearly be in frequent demand.

M.R.D.S.

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THE YORKSHIRE NATURALISTS' UNION

THE NATURALISTS' YORKSHIRE

Compiled by members of the Yorkshire Naturalists' Union and edited by W. A. Sledge. Pp. 96 with 15 photographic illustrations. Dalesman Publishing Co. Ltd. Obtainable from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 60p plus 13½p postage.

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 50p plus 9p postage.

Also "The Macro-lepidoptera of Spurn Head, E. Yorkshire" by S. L. Sutton and B. R. Spence (ex *The Naturalist*, 1974); price 25p plus 6½p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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CADDIS-FLIES OF YORKSHIRE

A. BRINDLE

Presidential Address to the Yorkshire Naturalists' Union, Bradford, 6th December 1975

Caddis-flies form one of the smaller orders of insects, less than 200 being recorded from the British Isles, and with one exception their larvae are aquatic, and occur in various kinds of freshwater habitats. They are not a popular order, being very small to rather large nondescript insects, and are possibly more familiar to anglers than to most naturalists. Even so the caddis-flies of Yorkshire have been well recorded, probably better than those of any other county in Britain, and this recording goes back well over a hundred years. McLachlan recorded a rare species, *Anabolia brevipennis* (Curtis), from Scarborough in 1862, and Porritt (1897) notes that two other specimens of this species were taken by George Jackson "probably at Askham Bog" in 1890, and passed to Alfred Beaumont. Mosely (1939) only recorded this species from Yorkshire, even though two other specimens had been recorded from Hale in Cheshire in 1865 and 1868, but he tended to ignore records of specimens he had not seen, and the location of the two specimens from Hale is uncertain. However, the two specimens belonging to Beaumont are now in Bolton Museum, together with a third, without data, which may be one of the Hale specimens. The other specimen from Hale may be that, also without data, in the Manchester Museum. I am indebted to Mr. E. G. Hancock of the Bolton Museum for the information on their specimens of this species. The species has subsequently been recorded from southern England, and also from Hawes Water in Lancashire, but always singly.

In 1873, McLachlan found *Allogamus auricollis* (Pictet) very common in autumn along the river Wharfe from "Ilkley Station to Bolton Abbey" (Porritt, 1897) and this species is still common along at least the upper Wharfe down as far as Grassington, and along the Skirfare in Littondale.

G. T. Porritt (1897) produced the first list of these insects from Yorkshire, recording 79 species out of the 162 then known from Britain, i.e. 49%. In the Victoria History of Yorkshire (1907) the total of caddis-flies recorded rose to 93 species (57%), whilst the most recent list by J. M. Brown and H. Whitehead (1938) lists 118 species out of the 184 British species (64%), although three of these appear to be mis-identifications. The present total for Yorkshire is 132 out of 193 British, giving 68%, and this is likely to be increased in the future. Mr. J. H. Flint, the recorder for Yorkshire has kindly given me the numbers and percentages.

Yorkshire is notable for having two species of caddis-flies which have not been found elsewhere in Britain. One is the curious flightless caddis, *Agrypnetes crassicornis* McLachlan, which is resident at Malham Tarn, and which was first found by the then warden, the late P. F. Holmes in 1950. It was checked by D. E. Kimmins of the British Museum (Natural History), who listed the world distribution of the species as Mongolia, Caucasus, Finland, and Malham Tarn (Kimmins, 1952). It has wings but apparently does not fly, although it can skate over the surface of the water with some rapidity. It is usually thought of as a relict species, and could occur elsewhere in Britain.

The second species is a small Leptocerid, *Triaenodes reuteri* McLachlan, which was found in some numbers, both as larvae and adults, in Walker Butts Bank Dyke, Spurn, in July, 1963, but which has not been seen since (Brindle, 1966). Its occurrence was unexpected since during the Spurn Insect Survey (1947-50) the dykes of the area had been well worked, and *T. reuteri* was not found. However, during the North Sea floods of January 1953, Walker Butts Bank Dyke was obliterated, and a new dyke was constructed the following year. Professor P. M. Butler found no insects in the new dyke in 1954 nor 1956, but in 1963 *T. reuteri* was common. It is uncertain where the species came from; it occurs in Sweden, and the numbers of migratory wading birds at Spurn suggested a possible method by which the eggs could have been brought, but whether this is the answer is unknown. Its apparent disappearance is also a puzzle. Searches have been made in the dyke in recent years, including 1975, but

without success. The species appears to have arrived as a coloniser of the new dyke, but conditions may have altered. From sampling the invertebrates it appears that the dyke is more saline at present although tests of the water have not yet been made. The present status of *T. reuteri* is doubtful.

The recording of the distribution of caddis in Yorkshire has largely been based on adults, since it is these which can be reliably identified. Adults however are adept at hiding, and are sometimes curiously elusive; they can fly far from their breeding places, and since many larvae can be satisfactorily identified, and can be collected in all weather, a combination of recording adults and larvae gives a better understanding of their true distribution in Yorkshire.

The recording of the distribution of adults and larvae in Yorkshire and elsewhere has been a study of the present author for some years, although only the west part of the present North Yorkshire has been at all adequately worked. This study has demonstrated the marked ecological differences between the various species, at least the more common ones, and although many factors are involved, it seems clear that the primary factor which influences the distribution of caddis, and which limits their distribution, is the oxygen content of the water in which the larvae live. It also seems to be the ability to exist in water of smaller oxygen content which has influenced the actual evolution of caddis, the more primitive larvae requiring water rich in oxygen, in effect running water, and the less primitive larvae being much more adaptable and capable of living in still water. In general running water is colder, has more oxygen than still water, and is not subject to such fluctuations of temperature; since colder water can hold more oxygen than warmer water, the oxygen content of running water tends to be more constantly high than that in ponds and lakes.

Caddis larvae fall into two groups — (1) the non case-making larvae and (2) the case-making larvae, the former representing the primitive type, which mainly occur in running water, whilst the more familiar case-making larvae are more dominant in still water. The life histories of the two groups show basic differences (fig. 1).

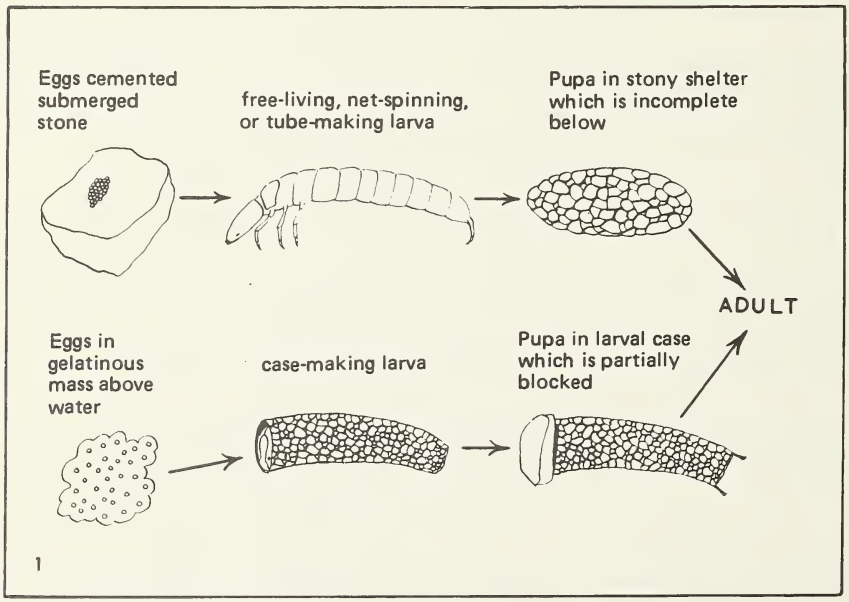


Figure 1
Life histories of a non case-making caddis (above) and a case-making caddis (below).

In the non case-making caddis, the eggs are usually cemented to a submerged stone or other object, the adult caddis-fly entering the water to lay the eggs; the larvae may be free-living (Rhyacophilidae); they may spin nets in which they live and feed (Philopotamidae, Polycentropidae, Hydropsychidae); or they may construct silken tubes on submerged stones or wood (Psychomyiidae). In each case the larva makes an incomplete stony shelter before pupation, which is fastened to submerged stones or wood. When mature, the pupa cuts its way out of the case, swims to the surface of the water, and the adult emerges.

In the case-making caddis, the eggs are usually enclosed in a gelatinous mass which is laid above water, the larvae dropping into the water on hatching. In some caddis the eggs collect in a mass at the end of the abdomen, and the female washes them off by dipping to the water surface; although the eggs sink and adhere to submerged objects, the adult does not actually enter the water. The larvae usually make their cases soon after hatching, and the cases are widened and extended as the larvae grow in size; before pupation the larvae partially block the openings of the cases and fix these firmly to some submerged object. The pupa cuts its way out of the case and swims to the surface to allow the adult to emerge as in the non case-making caddis.

The non case-making larvae show a progression from those restricted to fast flowing water to those which are more tolerant of slower water (fig. 2). *Rhyacophila* (Rhyacophilidae) is the most primitive type of larva, and closely resembles, both in structure and habits, the larva of the most primitive existing Megalopteron (Neuroptera), *Archichauloides divisus* (Walker) from Australia (Hamilton, 1940). The most obvious differences are that *Archichauloides* has spiracles as well as lateral gills, and comes to the bank for each ecdysis and for pupation. *Rhyacophila*, as in all British caddis, except for the terrestrial *Eniocyla pusilla* (Burmeister), lives entirely in the water until the adult emerges.

Rhyacophila is free-living and is the only larva with lateral tracheal gills which are many-branched; it has a high oxygen requirement and so is restricted to fast flowing water of stony streams and rivers. Its cuticle appears to be relatively tough, as one would expect in a free-living larva, and probably all its oxygen is absorbed through the gills. All four species occur in Yorkshire, the most common species, *R. dorsalis* (Curtis) having been found in all suitable streams and rivers sampled, but the others are more local. *R. obliterata* McLachlan occurs in hill streams or woodland streams; *R. septentrionis* McLachlan in limestone streams and rivers; and *R. munda* McLachlan occurs very locally in various streams.

Philopotamus (Philopotamidae) has no tracheal gills, and must absorb much oxygen through its cuticle. The only species, *P. montanus* (Donovan), is widely distributed in Yorkshire but is more local than *Rhyacophila dorsalis*, and occurs in hill streams or in lower woodland streams where the water is cooler due to shade. It lives within a finger-shaped net under stones, and is easily recognized by the narrow reddish or yellowish head, and the uniformly white or yellowish body. The other two genera, *Wormaldia* and *Chimarra*, also occur in Yorkshire, the former in woodland streams and the latter in fast rivers; their larvae are similar to that of *Philopotamus* but much smaller in size.

Plectronemia and the other Polycentropidae, also have no tracheal gills; the head is broader than in *Philopotamus* and is yellowish marked with darker spots, whilst the abdomen is pink or yellowish; the nets are broader and occur under stones. *Plectronemia conspersa* (Curtis) is common in stony streams and rivers; *Polycentropus flavomaculatus* (Pictet) is common in larger streams and rivers, in the latter it is joined by the closely similar *Cyrnus trimaculatus* (Curtis). *Cyrnus flavidus* McLachlan and species of *Holocentropus* are found in ponds and lakes, where they may be abundant in filamentous algae.

Tinodes and other Psychomyiidae make silken tubes on submerged stones or *(Lype)* on wood. The tubes are sinuous and covered with detritus or sand. These caddis have a fairly wide oxygen tolerance but do not occur in fast flowing water, presumably due to the fragility of the tubes. In Yorkshire, *Tinodes waeneri* (L.) is common in most larger rivers and in canals and lakes; *Psychomyia pusilla* (F.) is common in larger rivers; *Metalype fragilis* (Pictet) in some limestone streams and rivers; whilst *Lype phaeopa* (Stephens) is a widely distributed larva which makes its tubes on submerged wood in lakes and ponds.

Hydropsyche and the other genera of Hydropsychidae, can easily be recognized by the

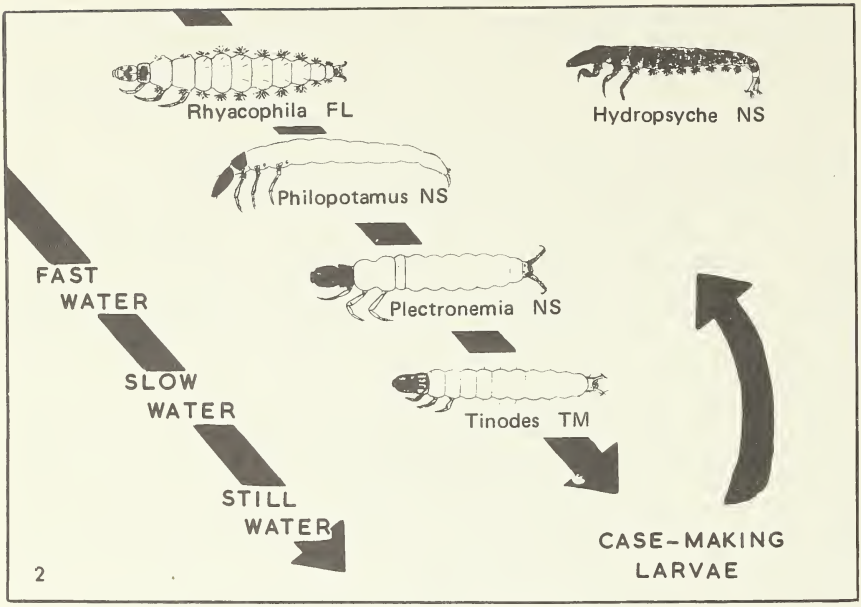


Figure 2
Types of non case-making caddis larvae showing progression from those restricted to fast flowing water to those found in slower water. Although case-making is thought to be a development allowing larvae to live in still water, some case-making caddis have returned to fast water.
(FL = free living; NS = net-spinning; TM = tube-making.)

ventral gill tufts. The cuticle is dark and tough and they make rather wide nets, often communal, under submerged stones. These are not primitive larvae, since the gill tufts are ventral, not lateral as is the primitive position, and they seem to be retrograde types. Most need well-oxygenated water, and occur in most streams and rivers. *Diplectrona felix* (Westwood) is local in small woodland streams; *Hydropsyche instabilis* (Curtis) seems to be common in most running water, whilst *H. angustipennis* (Curtis) occurs in slower water.

The transition in structure from these non case-making larvae to the case-making larvae, can be explained in terms of modifications which allow the larvae to live in water with less oxygen. Two main modifications are necessary — (1) the cuticle must become thinner to allow easier absorption of oxygen and (2) additional gills are useful. Either modification means that the abdomen of the larva becomes much more vulnerable to predators, so that the development of a case gives protection. This development has disadvantages, many cases being clumsy so that the larvae can only move with difficulty, but such a development has occurred in other orders of insects, in the Diptera (Tipulidae, Chironomidae), in the Lepidoptera (Psychidae, etc.) and others.

The head of the case-making larva has become vertical, instead of being horizontal, as in the non case-making larvae, and the larva can withdraw inside the case to block the opening with its strongly sclerotized head which forms an effective barrier. The larva holds the case by the paired hooks at the end of the abdomen, and has fleshy protuberances on the first abdominal segment to position the body in the centre of the case. The case, however, does prevent free access of water, so that the larva has to undulate its body constantly to promote a current of water through the case, and this undulation is also carried on by the pupa. If the

oxygen content of the water becomes too low, and the body undulations are not sufficient, the larvae will leave their cases, but this is a desperate measure since it exposes the larvae to attack. It is normally impossible to extract a larva from its case by pulling from the front, but the larva can be induced to leave by pressure, or other methods, from the rear. Trout feed on caddis larvae but swallow the case and the larva together (Mosely, 1926).

Case-making larvae have an inherent tendency to build their cases in a certain way, although this may be modified if suitable material is not available. This tendency assists in the identification of the larvae and some cases are distinctive. In streams and rivers a common case is that of *Agapetus* (if small, about 7mm) or *Glossosoma* (if larger, about 11mm) (fig. 3), which may be very common on stones. The case is like a tortoise-shell, being flat ventrally and convex dorsally, with openings at the antero-ventral and postero-ventral edges. A flatter case with larger pieces of stone along each side in fast running water is that of *Silo* (fig. 4); a similar case but larger, in slower water, is that of *Goera*. In hill streams a slightly curved case of relatively fine mineral material (*Odontocerum*, fig. 6) is distinctive if taken with the characteristic anchor-like dark mark on the yellow head of the larva. A similar case, but rather less curved, in rivers, the larval head being almost blackish, is *Sericostoma*, which has a wide distribution in Yorkshire. The very common *Potamophylax* case (fig. 7) is made of larger pieces of stone, and only slightly curved and broad, found in almost all streams and rivers, the head being dark but with a pattern of darker spots. *Halesus* has another broad case, almost straight, usually made of plant material, and blackish, often with a long piece of twig attached (fig. 9). *Athripsodes bilineatus* (L.), common along the Wharfe and other rivers, has a smooth curved case of rather fine sand grains (fig. 5), but *A. fulvus* (Rambur), found in association with freshwater sponges, makes its case from pieces of sponge. A most distinctive case is that of *Lepidostoma hirtum* (F.), common in most rivers, the case (fig. 8) being quadrangular in section in older larvae, and either made from plant or from mineral material; when younger the case may be tubular. A similar but smaller quadrangular case in small limestone rivulets is that of *Crunoecia irrorata* (Curtis) which is locally common in Yorkshire.

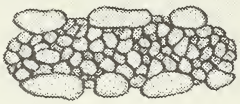
Although many species of caddis can be classed as either running water species or as still water species, the distinction is not clearly defined, and some can be found in either kind of water. To some extent this is due to the variability of the water — in most streams and rivers there are slow stretches, whilst the conditions on wave-washed shores of stony lakes are similar to those of stony streams and rivers. However the distinction is useful in practice.

A characteristic case of still water is that of the Phryganeidae, which is made of uniform pieces of plant material arranged spirally (fig. 11). This kind of case is confined to the family except for the genus *Triaenodes* (Leptoceridae), but in this larva the case is much narrower and smaller. *T. bicolor* (Curtis) is widely distributed in Yorkshire. Of the Phryganeidae, *Phryganea* is found in most larger ponds, lakes, or canals, whilst *Oligotricha* tends to occur in peaty pools or ditches. *Agrypnia*, locally common in lakes, makes a spiral case when younger, but tends to use cylindrical hollow plant stems when older. A smooth curved case, common in most ponds, lakes, and canals (fig. 12), is that of *Athripsodes aterrimus* (Steph.), the larva recognizable by the pattern of blackish spots and marks on the yellow head, whilst a broader case may be that of *A. cinereus* (Curtis) in which the head is yellow with only vague darker spots, and which also occurs in larger rivers. *Mystacides longicornis* (L.), common in most ponds and lakes, makes a straighter case usually with added longer pieces of twig or stem; the larval head is patterned as in *A. aterrimus* but the pattern is different. *M. azurea* (L.) makes a similar case to *M. longicornis* (fig. 10) but usually occurs in the slower parts of rivers, and can be separated by the head pattern. Both *Mystacides* sometimes make a case similar to that of *A. aterrimus*.

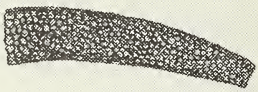
A most distinctive case is that of *Molanna* (fig. 13), a shield-shaped case of sand grains, and is invariably that of *M. angustata* Curtis; the second British species, *M. palpata* McLachlan is only known from Scotland. *Molanna* is common in most lakes, canals, and sometimes in the slower parts of large rivers. The most common caddis cases in lakes and ponds are those of the Limnephilidae, and it is these larvae which at present are difficult to separate. There are three fairly distinct types of case in *Limnephilus* — (1) cases of plant



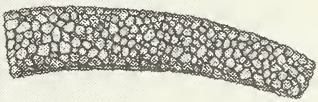
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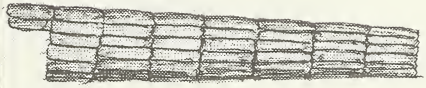
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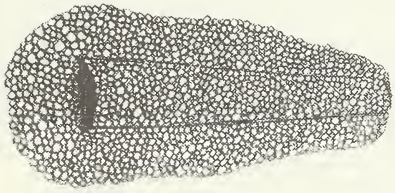
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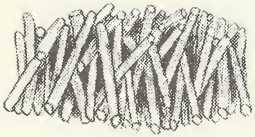
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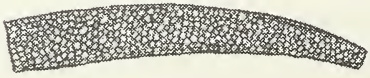
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material or with small shells, the material arranged transversely, and often untidily (fig. 16) which belong to the *L. rhombicus* group *(rhombicus, marmoratus, flavicornis,* etc.); (2) cases of plant material arranged longitudinally (fig. 15) which belong to the *L. lunatus* group *(lunatus, luridus, xanthodes,* etc.) of which *lunatus* is by far the most common species; (3) cases made from mineral material (fig. 17), which belong to the *L. vittatus* group *(vittatus, centralis, extricatus,* etc.). These cases may be similar to those of *Athripsodes* but are relatively broader and the head of the larva is dark brown.

There are, however, two species of Limnephilidae which are easily recognized as larvae, *Glyphotaelius pellucidus* (Retzius) making a tubular case of plant material with added pieces of leaf both dorsally and ventrally (fig. 14); this species is widely distributed in Yorkshire but never seems to be found commonly except as larvae. *Anabolia nervosa* (Curtis) is very common in the larval stage in canals, ponds, lakes, and in the slower parts of rivers. The case is made from mineral material or with added plant material, and usually has long pieces of twig attached, but these can be absent where such material is scarce (fig. 9, *Halesus* is rather similar but is mostly of plant material and the head of this larva is dark with darker spots). *Anabolia* is recognized by the yellow head with darker spots laterally, and with a characteristic mushroom shaped dark mark in the middle of the head.

Caddis larvae seem to be opportunists in the matter of food. The horizontal head and often sharply pointed mandibles of the non case-making larvae are sometimes interpreted as indicating a carnivorous diet, whilst the vertical head and blunt mandibles more typical of the case-making larvae are similarly interpreted as indicating a herbivorous diet. This is not necessarily correct, and recent research has shown that previous assumptions on the food of caddis larvae based on the structure of the mouthparts can be quite erroneous (Hickin, 1967). *Halesus*, a case-making caddis has been recorded as catching and feeding on trout alevins, and case-making caddis of the Limnephilidae, Leptoceridae and other families will gather to feed on dead fish or insects in the water. In general, larvae in running water tend to be more carnivorous or detritus-feeders, since submerged plants tend to be absent, whilst those living in lakes and ponds with plenty of pondweed tend to be more herbivorous, but this is by no means a rule. *Phryganea*, a still water species, will eat plants or insects with equal zest.

Although caddis distribution does seem to be mainly due to the oxygen content of the water, other factors are involved. Temperature of the water is so closely related to oxygen content that it is difficult to separate these factors completely. It is also clear that acid waters are less rich in insect life than alkaline waters, but it is not thought that alkaline conditions affect the larvae directly, and more likely have an indirect effect by promoting a rich growth of moss, which provides shelter and food, or in other ways. Some caddis live in a variety of waters, *Phryganea obsoleta* McLachlan, for example, is common in beds of *Chara* in the highly alkaline Malham Tarn, but also occurs in numbers in the acid peat pools on Tarn Moss.

Drought brings problems, and the dry summer of 1975 has adversely affected the population of caddis in various Yorkshire rivers, streams, and ponds, due to the evaporation of the water. Some species escape summer drought by their long adult life, from early summer until the autumn when eggs are laid. Many smaller species however seem to have a continuous cycle through the warmer months. An effective way of countering the effect of drought is by sheer force of numbers, so that although a proportion of the larvae die, sufficient survive to build up the population later. At Malham Tarn, one of the most

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Figures 3-17 (Opposite page)

Types of caddis cases from Yorkshire: 3, *Agapetus fuscipes* (Curtis); 4, *Silo pallipes* (F.); 5, *Athripsodes bilineatus* (L.); 6, *Odontocerum albicorne* (Scop.); 7, *Potamophylax latipennis* (Curtis); 8, *Lepidostoma hirtum* (F.); 9, *Halesus radiatus* (Curtis); 10, *Mystacides longicornis* (L.); 11, *Phryganea varia* (F.); 12, *Athripsodes aterrimus* (Steph.); 13, *Molanna angustata* Curtis; 14, *Glyphotaelius pellucidus* (Retzius); 15, *Limnephilus lunatus* Curtis; 16, *Limnephilus rhombicus* (L.); 17, *Limnephilus vittatus* (F.).

common small caddis is *Tinodes waeneri* (L.), the larvae building silken tunnels on stones mainly in shallower water. The numbers of adults is normally very large; in 1969 counts of over 50 individuals occurred per yard of shore line, giving a possible total for the entire Tarn of over 250,000 at any one time. Two years ago the Tarn level was lowered to allow repairs to be made to the outflow, so that a large area of the shallow parts of the Tarn were exposed for several weeks in late summer and autumn. This resulted in a reduced population of *Tinodes* the following year, but now the numbers are almost back to their normal level.

Another feature which is specially applicable to Yorkshire is the disappearing streams, which have aquatic insects in spite of the variability of the water level. Such streams may hold a high population during winter when the streams are flowing, but research is badly needed on the ability of the insect inhabitants to withstand the long periods of drought when the streams cease to flow above ground. In those streams which run normally but enter swallow holes at some point, the exposed streams can be very rich, and some insects are bound to be washed into the subterranean parts during floods. Caddis larvae have been found below ground, but they are likely to develop normally only in cave thresholds, and underground streams generally do not appear to carry sufficient food to enable any appreciable development of an insect fauna.

Pupation occurs inside the pupal shelter, or inside the closed larval case. The pupa is free and has a pair of functional mandibles with which it cuts its way out of the case, to swim to the water surface or to projecting objects.

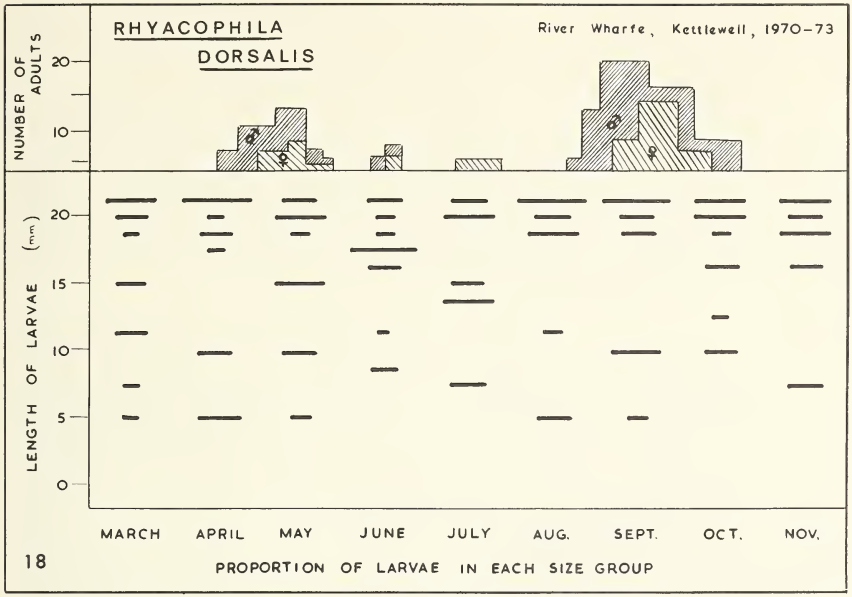
The life history of many species, except for the smaller ones, seems to take one year. Surveys of larvae and adults of *Rhyacophila dorsalis* (Curtis) in the Wharfe, and of *Molanna angustata* Curtis in the Leeds and Liverpool Canal (figs. 18, 19) have been made and show marked differences. That of *Rhyacophila* indicates that fully grown larvae occur in any month of the year, although the adults only appear to be present at certain times — mainly a fairly large emergence in spring, and a much larger autumn emergence, with small numbers during part of the summer. From these results no simple pattern of life occurs and it is not possible to separate any broods. In *Molanna* there is a definite pattern, showing that the larvae feed up quickly in autumn, less quickly in spring, and the adults occur as a single brood during July, August, and early September. This latter type of life cycle is perhaps the most common, and the indefinite life cycle may only occur in very common running water species. It should be noted, however, that the other three, less common, species of *Rhyacophila* emerge as a single brood, and in some common lake species the length of time which the adults are found suggest that more than a single brood occurs in a year.

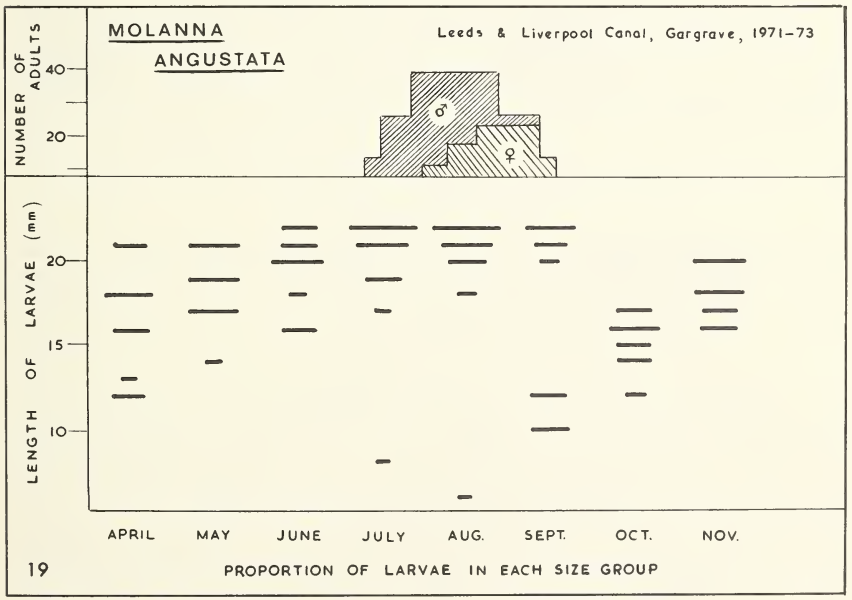
Although the smaller caddis appear to be short lived as adults, some adults live for several weeks or more. Many Limnephilids are not sexually mature on emergence, and only become mature after a period of time during which they may wander far from water. Other species are sexually mature on emergence and tend to remain near the breeding places where breeding may be continuous, and the length of adult life short. A number of species congregate by day in swarms, usually low over the water, but sometimes higher near trees, and these swarms are of males, females flying into the swarm at times to mate, the pair then leaving the swarm. This mainly applies to the Leptoceridae, and the swarms may be of more than one species.

Most adult caddis, however, are nocturnal, and hide by day. They are attracted to light so that caddis are often found in light traps intended for moths. A good deal of the present research on the distribution and flight periods of the adults relies mainly on continued use of light trapping.

The adults of some species appear to emerge in relatively small numbers throughout the flight period, the numbers reaching a peak about the middle, but in others mass emergences take place and these may be of short duration, so that the actual flight period extends only over a week or so. These species therefore are the ones which can easily be overlooked.

The continued recording of caddis in Yorkshire should increase the present total, more especially in the local species, or in those in which the flight period is very short. *Oligotricha ruficrus* (Scopoli) is a widely distributed species which has a short flight period and is recorded from Yorkshire. The other species of the genus, *O. clathrata* (Kolenati), seems to





Figures 18-19
Contrasts in the life cycles of caddis — 18, *Rhyacophila dorsalis* (Curtis); 19, *Molanna angustata* Curtis.

have a very short flight period, and not many years ago was only known from Chartley Moss in Staffordshire, but it has recently been found in Shropshire and in Scotland, so that the chances of its occurrence in Yorkshire are high. Yorkshire is large and difficult to cover adequately so there are likely to be some surprises in caddis recording in the future.

Hickin (1967) is the most useful book on caddis larvae and their identification, since all larval keys to that date are included. Further keys are in preparation and the identification of larvae should become more certain, but even using the best modern keys the separation of closely allied larvae can be difficult. The standard textbook on the identification of caddis adults (Mosely, 1939) is very useful, especially for the figures of wings; the figures of genitalia are generally reasonable although some are somewhat inaccurate. The latest key to adults is that of Macan (1973) which figures the genitalia in much more detail, and keys out the species more adequately.

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BOOK REVIEW

Butterflies, by **Geo. E. Hyde.** Pp. 64. Almark Publishing Co. Ltd. 1974. £1.25.

This book is very similar in style and layout to the two butterfly booklets by the same author published in the Jarrold Nature series and recently reviewed in these columns. Whether a further book covering the same ground can be justified is probably a matter of opinion. The present work, however, gives much fuller treatment. After an introduction and detailed comment on distribution, each of the British species is described under the sectional headings: "Special features", "Range and haunts" and "Life History".

A few errors, mostly of a minor character, are present. The usual foodplant of the Chalk-hill Blue is *Hippocrepis comosa*, not *Anthyllis.* Recognition of the Black Hairstreak as a British species dates from 1828, not 1928. In line with present custom, *Hamearis lucina* is described as the "Duke of Burgundy": the reference therefore to a butterfly group of which this insect is not a member, seems superfluous and misleading.

Nearly all the colour portraits represent parts of the author's excellent work which have not hitherto come under our notice. On the whole the colour reproduction is very good but is marred in a few instances by lack of contrast, as witness the Ringlet and Black-veined White.

Essentially intended for the country lover, and all who appreciate the natural, lovely things of this earth, this book will make a strong appeal and may be highly recommended.

C.R.H.

POLLUTION ON A HUMBERSIDE BATHING BEACH

M. R. WARD & R. GOULDER
Department of Plant Biology, University of Hull

In the United Kingdom the bulk of sewage from coastal towns is discharged without treatment into the sea, a matter of concern to bathers and also to anyone who cares about the quality of the environment. One might object to this discharge on health grounds; but a Medical Research Council report[1] has concluded that, except on the most foully polluted beaches, the risk to the health of bathers may for all practical purposes be ignored. One can, however, also object on aesthetic and environmental grounds. It is aesthetically unpleasant to encounter solids which have originated from sewage, also simply to know that sewage is being discharged can take the edge off the enjoyment of sea bathing. Further, sewage upsets the balance of the natural seaside flora and fauna.

The Consumers' Association[2] has recently objected on aesthetic grounds to this pollution of bathing beaches. A more potent threat to the present method of seaside sewage disposal is however posed by a directive submitted by the Commission of the European Communities[3] which sets water quality standards for beaches on which member states authorize or tolerate bathing. This directive, which the Commission hopes will be enforced within eight years, requires the frequent collection of samples, from all bathing beaches, for chemical and microbiological analysis. If 95% of samples do not reach the standards, then a beach will have to be closed. In a European Parliament debate[4] Lord Bethell proposed that the words 'or tolerated' be deleted from the draft of the directive. This amendment, which was rejected, would have excused the U.K. since sea bathing in this country is 'tolerated' rather than 'authorized' unlike, for example, on many Mediterranean beaches. A House of Lords select committee[5] has also criticised the application of the directive to U.K. beaches, chiefly because of cost (perhaps £100 millions/year) and the public outcry which might arise if beaches were closed on arbitrary environmental criteria rather than on health grounds. However, the directive was adopted by the Council of Ministers on 16 October 1975[6], although the original text was only approved in principle and some details (at December 1975) are still to be worked out (Commission of the European Communities, London — personal communication).

It is likely therefore that the condition of bathing beaches will shortly become a matter for public debate. It seems to us that a contribution of this debate at a local level might be made by the publication of some data obtained by one of us (M. R. Ward) during a survey of Cleethorpes beach which was carried out in summer 1975 with the support of the Anglian Water Authority. In this survey, concentration of total coliform bacteria was measured. This is one of the criteria used in the directive and is an indicator of faecal pollution because the gut bacterium *Escherichia coli* makes up a proportion of total coliforms.

Description Of The Survey Area

Cleethorpes is a resort town situated immediately south-east of Grimsby on the south bank of the outer Humber. The bathing beach and positions of the major outfalls in the area, which carry the sewage of more than 100,000 people along with some trade effluent, are shown in Fig. 1. Pyewipe outfall discharges at all states of the tide into an open gulley at high water mark. Riby Street outfall also discharges at all states of the tide but from a 280 m pipe at around low water mark. Cleethorpes outfall discharges from 1 h before to 2 h after high tide (and at other times when the holding tank becomes full) from a 1,120 m pipe also around low water mark. The dry weather flow from each outfall is estimated as 3-6 million gallons/day ($1.4 - 2.7 \times 10^4 m^3$/day); there is some screening and maceration before discharge.

Methods

Samples were taken, after wading out to a depth of 1m (or on 13 September from a boat), in sterile bottles held 30 cm beneath the water surface. Samples were transported in an ice-box

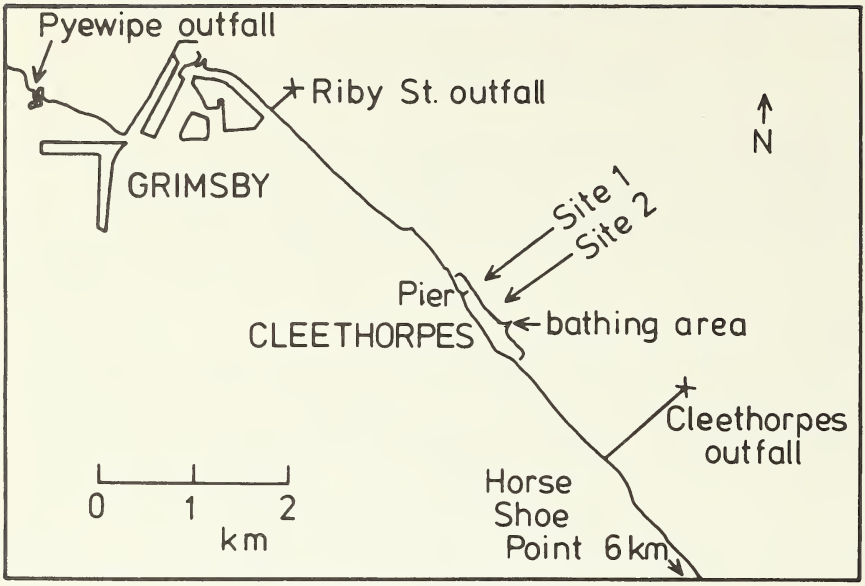


Fig. 1. Map of the survey area.

Location	Date	Time (hours from high tide)	Coliforms/100cm^3
100 m N.W. of Cleethorpes outfall	30 July	− 1	5.1×10^7
		high tide	1.2×10^7
		+ 2	5.8×10^4
100 m N.W. of Riby St. outfall	5 August	− 2	5.8×10^4
		high tide	2.2×10^4
		+ 2	3.5×10^4
100 m S.E. of Riby St. outfall	5 August	− 2	4.4×10^4
		high tide	1.6×10^4
		+ 2	1.2×10^4
100 m N.W. of Pyewipe outfall	5 August	− 1	9.8×10^6
		high tide	5.8×10^6
		+ 2	7.1×10^6
100 m S.E. of Pyewipe outfall	5 August	−1	5.0×10^6
		high tide	1.1×10^6
		+ 2	4.9×10^6
Horse Shoe Point	30 July	− 1	47

Table 1. Concentrations of total coliforms at extreme sites in the Cleethorpes-Grimsby area, summer 1975.

and coliform assays were begun within 6 h using the membrane filtration technique[7]. 20 cm^3 of diluted sub-samples were filtered through 47 mm diameter, 0.45 μm pore size, Oxoid membrane filters which were then incubated for 18 h at 35°C on pads impregnated with Oxoid membrane enriched teepol broth. Coliform (yellow) colonies were then counted and total coliform concentrations calculated. This technique was used for convenience in preference to the multiple tube method[7] which is, in fact, specified for total coliforms in the Community directive. It is possible that the membrane technique at times yields rather lower counts than the multiple tube method.

Results and Conclusions

Samples were initially taken at extreme sites. These were from 100 m either side of the line of the outfalls and, for contrast, from Horse Shoe Point on the coast 10 km south-east of Cleethorpes (Fig. 1). The results are given in Table 1; highest total coliform concentration was $5.1 \times 10^7/100$ cm^3 close to Cleethorpes outfall, while the concentration at Horse Shoe Point was only 47/100 cm^3.

It seemed sensible however to concentrate on the beach most used for bathing. Samples were therefore taken, at various states of the tide between 11 August and 4 September, from two sites in the bathing area. These were site 1, which was adjacent to the pier, and site 2, which was 300 m along the beach south-east of the pier (Fig. 1). The range of coliform concentrations recorded was from 1.10×10^3 to $7.25 \times 10^4/100$ cm^3. Highest concentrations were found when the tide was in; 10^4 or more/100 cm^3 being found in 18 out of 23 samples taken within 2 h of high tide but in only 3 out of 14 taken more than 2 h from high tide (Table 2).

Table 2. Concentrations of total coliforms (thousands/100 cm^3) at two sites on Cleethorpes beach.

Time (hours from high tide)	Site 1	Site 2
low tide	3.1c	3.9c
− 4	8.3c 2.3e	7.5c 30.0e
− 3	7.8e	19.3e
− 2	11.0d	6.4d
− 1	30.8a 44.8d 21.0e	72.5a 16.9d 23.1e
high tide	1.5a 8.0d 10.0e	22.5a 24.7d 2.3e
+ 1	31.9a 7.0b	14.2a 56.1b
+ 2	25.0a 31.1b 12.5d	37.5a 10.0d
+ 3	10.0b	2.6b
+ 4	4.0c	6.6c
+ 5	6.2c	1.1c

Subscripts indicate the sampling date (a = 11 August, b = 13 August, c = 19 August, d = 27 August and e = 4 September 1975).

Samples were also taken at site 1, on 13 September at high tide, at distances of 50 to 750 m from the sea-wall out into the estuary. Coliform concentrations (maximum $2.05 \times 10^4/100$ cm^3 at 50 m) decreased with increase in distance from the sea-wall (Table 3).

The results, although from relatively few samples, suggest that areas close to the outfalls were grossly contaminated. This suggestion was supported by the observation of an

Table 3. Concentrations of total coliforms (thousands/100 cm^3) at site 1 at various distances from the sea-wall at high tide on 13 September 1975.

Distance from sea-wall (m)	50	150	200	500	600	750
Coliforms	20.5	11.9	13.0	3.6	5.3	5.9

abundance of sewage derived solids (macerated paper, peas carried in with trade waste from food factories, condoms and, at Pyewipe, solid faeces). The bathing beach, however, was apparently less polluted although coliform concentrations were still high and sewage solids were at times observed. Most bathing takes place close to the sea-wall around high tide (the water is too far away at low tide) and it is disconcerting that the data in Tables 2 and 3 suggest that this may be the time and place where most pollution is found.

In conclusion, the maximum total coliform concentration permitted by the Communities' directive is 10^4/100 cm^3, a level exceeded by 24 out of 43 samples from the bathing area (Tables 2 and 3). It appears, therefore, that if Cleethorpes beach is to meet proposed European standards then there must eventually be some changes in the method of sewage disposal; either treatment or resiting of outfalls, or both, will be needed.

References

[1] Sewage contamination of bathing beaches in England and Wales. Medical Research Council Memorandum, No. 37, H.M.S.O., 1959.

[2] Seaside sewage revisited. Which?, pp. 206-208, July 1975.

[3] Proposal for a Council Directive relating to pollution of sea water and fresh water for bathing (quality objectives). Official Journal of the European Communities, Vol. 18, No. C67, pp. 1-11, 1975.

[4] Report of proceedings for Tuesday 13th May 1975, Directive on the pollution of water for bathing. Official Journal of the European Communities, Debates of the European Parliament, Annex No. 191, pp. 46-53, 1975.

[5] Thirtieth report from the select committee of the House of Lords on the European Communities. H.M.S.O., 1975.

[6] Developments in the European Communities April — October 1975. Cmnd. 6349, p. 11, H.M.S.O., 1975.

[7] The bacteriological examination of water supplies. Department of Health and Social Security, Reports on public health and medical subjects, No. 71, H.M.S.O., 1969.

BOOK REVIEW

Animals in Danger translated by **Irene R. Anderson.** Pp. 61. Frederick Warne. 1975. £2.50

This is the twelfth title in the successful 'Private Lives of Animals' series. Although the book is designed for a younger audience than this journal's readership, it is pleasing to record publications dealing with the preservation of the world's fauna, of which about 1000 species of birds, mammals, amphibians, reptiles and fish are threatened with extinction.

The book has a delightful cover and a lively text, and is copiously illustrated in full colour. There is some space wasting — for example, the contents list is repeated twice — and the text begins on page 9 (the cover, fly-leaf and title-page are included in the pagination!), which makes this a rather pricey publication at approximately 5p per page. Nevertheless, it will be warmly appreciated by children of the junior school age-range, and prove to be a most acceptable birthday gift.

M.R.D.S.

LADY'S SLIPPER ORCHID (*CYPRIPEDIUM CALCEOLUS* L.): A PLEA FOR HELP IN ITS CONSERVATION

J. D. LOVIS

There can be by now very few readers of *The Naturalist* who are not well aware that *Cypripedium calceolus* L., the Lady's Slipper Orchid, is still alive on a site 'somewhere in Yorkshire'. The existence of this site has now been so thoroughly publicised by articles in newspapers and a feature on television that it seems very unlikely that further harm can come from now admitting its existence in the pages of *The Naturalist*.

The purpose of this article is to solicit help in conserving this unique member of our flora and to explain what is currently being attempted in this respect, since it has become distressingly evident that there is a great deal of misunderstanding concerning the activities and aims of the Nature Conservancy Council with respect to *Cypripedium calceolus*. In consequence the N.C.C. is not getting the assistance from naturalists that it needs in relation to its efforts to save this species in Britain. (I should perhaps make it clear straight away that I am not a member of the staff of the N.C.C.).

Conservation of *Cypripedium calceolus* presents uniquely difficult problems. Usually it only produces single flowers, which are however large, very conspicuous and quite unmistakeable. It is a strange and beautiful plant, which exerts a literally fatal fascination. Its history in this country is a deplorable sequence of greed and exploitation (now, unfortunately, being repeated on the continent). Worst of all, there is now exceedingly little of it left.

There is no doubt that the population of *Cypripedium calceolus* in this country is now far below a viable minimum level. This means that unless it can be assisted to increase its population size, it will certainly become extinct from natural causes, even if the hand of man does not (as past experience makes only too likely) first apply the *coup de grace*. Unlike *Ophrys apifera* (Bee Orchid), *C. calceolus* is not adapted for self-pollination. Isolated plants have no chance of being pollinated, simply because of the lack of a pollen source. Even where two or three flowers occur in proximity, the chance of pollination is low. Like other orchids, *Cypripedium* pollen is transferred in sticky masses — an all or nothing tactic. The likelihood of seed being set naturally in this country is therefore very remote.

Orchids appear to be peculiarly sensitive to subtle climatic changes, and their distributions can fluctuate markedly, as is witnessed by the recent behaviour of *Corallorhiza trifida* (Coral-root), *Himantoglossum hircinum* (Lizard Orchid), *Neotinea intacta* (Dense-flowered Orchid) and *Orchis simia* (Monkey Orchid). At present, *Cypripedium calceolus* is, at least in terms of flowering performance, undergoing a renaissance. Records exist for the known colony since the early 1930's, and the contrast between flower production on this site prior to 1945 and that during the past decade is very striking. This has occurred in spite of a reduction in the size of the colony due to human depredations. Climatic conditions at the present time thus clearly favour flower production. No one can tell how soon this trend will be reversed. Climate is always changing, albeit subtly. Ultimately a time will come when not only is flowering suppressed, but vegetative performance is also depressed, below that required to restore the substance of the rhizome and its contained reserves to their level of the preceding dormant season. (Production of an aerial shoot involves a substantial drain on the resources of the rhizome.) Such unfavourable climatic conditions may persist for an indefinite period, during which a large colony would suffer only a reduction in size and be able to recover when more favourable conditions returned, but a tiny one will ultimately disappear altogether. The only uncertainty is just how soon this depressing turn of events will come to pass. This is not speculation, but simply the inevitable outcome, unless the population can be assisted artificially.

The policy of the N.C.C. has been to warden the site*, particularly during the critical weeks when the orchid is in flower, and to pollinate the flowers artificially. A similar policy has produced remarkable results on the site of the rediscovery of *Orchis simia* in Kent. Last year, a memorable year as we all know for its summer weather, was also an *annus mirabilis* for *Cypripedium calceolus*. Conditions at time of pollination, a very critical period, were warm and dry. For once, the slugs kept away, and copious seed was set, which has now dispersed over the area. (Orchid seed is quite tiny, and a single capsule has the potential to produce a vast amount of seed.) However, this project is essentially a long-term one, for the development of *C. calceolus* from seed is very slow. It is believed that it requires 3 to 5 years after germination for the production of the first leaf, and it is likely to be 6 to 10 years before young plants can readily be detected under natural conditions in Yorkshire. One doubt remains which cannot at present be resolved. The colony is almost certainly a clone, the product itself of a single seed. Many plants are self-incompatible. It is not yet known whether or not British material of *C. calceolus* is self-fertile. This question is normally resolved simply by a germination test on seed resulting from controlled self-pollination. To provide a control cross-pollinated seed has been produced by hybridising plants of known Swiss and presumed English origin. Attempts have been made to germinate both this seed and 'selfed' seed of garden origin in a university laboratory, in a government research establishment and by commercial orchid specialist nurserymen. To date, all have failed. Thus, at present we have no means of telling whether the failure of 'selfed' seed to germinate in culture is due to self-incompatibility or to the incompetence of our culture techniques. Meantime, a ripe capsule of native origin has been stored in the Royal Botanic Gardens (Kew) seed-bank to await the day when the technical problem is solved.

It is therefore not yet possible to be sure that our native *Cypripedium calceolus* does not possess a self-incompatibility mechanism which would render abortive the present attempts to restore British populations through reproduction by seed. Ideally, this problem could be outflanked very simply by transferring pollinia between two separate colonies. It must be stressed that it would in any case be much preferable to cross two colonies, since seed obtained by cross-fertilisation is much more vigorous than the progeny of self-fertilisation and would yield a genetically more healthy population, better able to respond to future environmental changes. However, to cross-pollinate requires the existence of a second colony!

As was pointed out above, there is clear evidence from the record of the performance of the monitored colony that after years when conditions inhibited the flowering of *Cypripedium calceolus*, in recent years the reverse has been true. *C. calceolus* is extraordinarily difficult to detect when only vegetative, due principally to the nature of its usual habitat, but also to its resemblance to vegetative shoots of some other plants. A small colony, not producing flowers, could easily escape detection for decades. It is clearly reasonable that the same climatic conditions which have produced flowering on the monitored site may well have now induced flowering in any other colonies which may have survived. It is therefore not surprising that rumours of other *Cypripedium* colonies have been frequent in recent years, though those 'leads' which have come to the attention of the N.C.C. have all provided to be abortive, and the N.C.C. has as yet no knowledge of a second native site. However, these rumours have become so persistent that even I, a confirmed sceptic, now find it difficult to believe that they contain no substance.

It is understandable that anyone who discovers a 'new' *Cypripedium calceolus* colony may believe that the only effective means to protect the site is to maintain total secrecy. It is understandable, but in my view profoundly mistaken. The plant is safe, more or less, from human molestation if it does not flower, but if it flowers, it is then so conspicuous that sooner or later someone else will 'discover' it. (The monitored site was certainly 'found' several times before it was wardened.) Ultimately, the next discoverer will be some unscrupulous person, and that will be the end of it. In any case, as I have explained, even if the plant experiences a

*Extended periods of wardening have been possible through valuable support from the Yorkshire Naturalists' Trust and considerable financial help from the World Wildlife Fund.

charmed life and escapes, by good fortune, the attentions of innocents and villains alike, secrecy can convey only short-term protection. A single flower cannot set seed unassisted, and come a sufficiently extended phase of unfavourable climate, the plant will diminish and eventually disappear.

At this point I should emphasise that the N.C.C. was not responsible for the wardened site becoming common knowledge. For more than two decades, while the colony flowered not at all, or only infrequently, the secret was well kept by a small group. Only after unexpected publicity on television had immediately produced a raid on the colony, followed by annually increasing public knowledge of the site to an extent that the matter got quite out of hand, only then was the N.C.C. (which still did not know the location of the site) approached to see if it would accept responsibility for protection of the colony.

I am satisfied that anyone who does confide to the N.C.C. details of the existence of a second colony can rely upon the N.C.C. showing complete discretion. It is unfortunate that much suspicion still exists regarding the N.C.C., presumably because it is a government body. However, the field officers of the N.C.C. are not Whitehall bureaucrats, but people who are doing their job because they are at least as concerned as the responsible amateur naturalist with the preservation of our natural heritage.

Why bother at all? I have occasionally been asked this question by people who make the point that even if the Yorkshire population is lost, surely the species can be re-established by importation from the continent? There are, of course, a number of reasons why this would not be a good idea, though I have found it difficult to answer this question so as to convince anyone who was of such a frame of mind as to have asked it in the first place. Here I will exclude chauvinistic pleas and any taint of sentiment, and merely comment that though morphologically virtually indistinguishable from some continental populations, the Yorkshire plant will certainly be genetically and physiologically distinct, simply because the climate of Yorkshire is not that of the continental Alps.*

Let me now make my case absolutely clear. I have tried to explain why the N.C.C. is so anxious to gain access to a second colony, if one exists, in order that cross-pollinated seed can be produced on wild plants. Propagation by seed, preferably and perhaps necessarily produced by cross-pollination, is the only way open to us to save this species in Britain. Secrecy, with or without wardening, is doomed to ultimate failure, since even if theft and vandalism could be precluded, only a minor climatic change would be sufficient to eradicate our tiny population.

Anyone who is in possession of knowledge of a second colony and does not now inform the Nature Conservancy Council†, should realise that they will have contributed towards, and must bear some of the responsibility for, the ultimate disappearance of this species from Britain just as effectively as if they had cut the flower and put it in a vase or a plant press, since they will have just as certainly deprived the plant of the opportunity of setting seed, which is the only way in which it may be saved.

*There is some evidence that private individuals have occasionally tried to establish continental material of *C. calceolus* in former native localities.

Though no doubt well-meaning, such attempts are misguided. If successful but still not disclosed, they could lead to confusion. Anyone who can give information regarding the existence of introduced colonies will perform a valuable service.

†The appropriate address is as follows: Dr. Helga Frankland, Regional Officer (North), North Regional Office, The Nature Conservancy Council, Merlewood Research Station, Grange-over-Sands, Cumbria LA11 6JU. (Mark envelope CONFIDENTIAL).

BOOK REVIEWS

The Morphology of Pteridophytes by **K. R. Sporne**, 4th edition. Pp. 192 with 41 text figures. Hutchinson, University Library. 1975. £2.50.

Dr. Sporne's book is so well adapted to undergraduate requirements that reprintings and revised editions have followed one another at regular intervals since its original publication in 1962; and more will doubtless follow. New discoveries in fossil botany continue to be made and ideas about interpretations of morphological structures and phylogenetic relationships are constantly having to be revised in the light of these discoveries. It is therefore in the sections of this book dealing with fossil groups that thegreatest changes are to be found. An extra chapter has also been added describing the possible forerunners of seed plants. A surprising feature having regard to the numerous revisions the text has undergone is the perpetuation of a number of errors which appeared in the original issue and still remain unchanged. [To one of these attention was drawn in our review in *Nat.* 1962, 34.] This is nevertheless a book which for the students for whom it is intended would be difficult to improve upon.

W.A.S.

The Small Shrub Garden by **Judith Berrisford**. Pp. 211 + 24 plates. Faber & Faber, London. 1976 (dated '1975'). £4.95 hardback; £1.75 paperback.

It is good to have Miss Berrisford's 'The small shrub garden' in print again, in a new and revised edition. Like all her books, it combines imaginative ideas for the creation of an unusually interesting garden with the most practical and down to earth advice for its successful achievement. Lucidly and elegantly written, the book is a pleasure to read, and a mine of information in an incredibly small compass. The illustrations are well chosen, and there is a good index (although I did note the omission of *Eleagnus ebbingei*, p.51). This is a book for the enthusiastic small garden owner with ambitions beyond the forsythia and flowering currant in his neighbour's quarter-acre. There are informative chapters on pruning, propagation, and pests and diseases, and the meticulously compiled 'Lists of shrubs and trees suitable for the small garden', giving details of height, ultimate spread and flowering period should prove most helpful to anyone planning a new garden or wanting to reorganize an older one. It is definitely a book which the keen gardener will want to own rather than to borrow, so one welcomes its availability in both paperback and hardcover versions.

V.A.H.

Bryological References in The Naturalist 1875-1975 by **G. A. Shaw.** Pp. 31. 1976. Obtainable from Dept. of Plant Sciences, University of Leeds. 25p (incl. postage).

There is a wealth of natural history information to be found in *The Naturalist*, but although there are annual indexes, the subject matter is not arranged alphabetically and it is difficult to abstract this information. The need for a comprehensive index to cover the first one hundred volumes was stressed in a recent editorial (*Naturalist*, 1976, p.2). It is most pleasing to report the first stage in this task: a detailed analysis of the considerable bryological component of our journal. A year-by-year breakdown of content is cross-referenced to localities and species. A list of obituaries of bryologists is also provided. We are indeed indebted to Mr. Shaw for compiling this valuable source of references.

M.R.D.S.

OCCURRENCES OF THE WHITE-WINGED BLACK TERN IN YORKSHIRE

RICHARD WELLS

On 19th June 1975, a White-winged Black Tern, *Chlidonias leucopterus*, spent all day on a small subsidence flash near Wath Ings in South Yorkshire. The bird was in almost full breeding plumage with the first signs of moult to winter dress appearing on the black underwing coverts. A second White-winged Black Tern was recorded at Fairburn Ings (West Yorkshire) on 25th August, when an immature with a black 'saddle' and whitish tail spent three hours feeding over the water. These were the tenth and eleventh Yorkshire records of this rare visitor from Eastern Europe.

Nelson (1907) cites only three records for the county and describes the species as a "casual visitant from southern Europe of extremely rare occurrence". The first was obtained in 1860 near Scalby Mills, Scarborough; the second, at Flamborough, when a mature bird was seen for some days in the spring of 1867; and at Scarborough, a specimen was shot on 26th September, 1896. When the county's avifauna was reviewed by Chislett (1952) no further records were mentioned. It was, in fact, 1961 before the fourth record for the county was accepted. The Yorkshire Naturalists' Union Ornithological Report for 1961 states:

> "Two at Chelker Reservoir on 13th May (Mrs. O. M. Pennock, W. F. Fearnley and A. Riley)."

It is, perhaps, surprising that such small play was made of this record. It was, at that time, the first record of the species in Yorkshire in the twentieth century, and the first county record for 65 years. Even up to the time of writing it remains the only occurrence of more than one White-winged Black Tern at any Yorkshire locality at the same time.

The records of this species so far this century are detailed below:

1961: Two at Chelker Reservoir on 13th May.
A juvenile at Hornsea on 19th August.
1964: One breeding plumage at Kilnsea on 24th July; no doubt it was the same bird which passed Spurn later the same day.
1966: An immature at Elsecar Reservoir on 18th September.
1969: One at Hornsea Mere from 1st-13th September.
1975: One at Wath Ings on 19th June.
One at Fairburn Ings on 25th August.

All these records have been accepted by the Y.N.U. and *British Birds* Rarities Committees.

It will be seen from the above that there are almost three times as many records in Yorkshire from 1961 to 1975 as there are during the one hundred years prior to 1961. The increase is probably genuine and not due to more extensive field work by more ornithologists (note the absence of records from September 1961 to June 1964 and from June 1969 to August 1974). It is also unlikely that the paper on identification of the three marsh terns in winter plumages (Williamson, 1960) has in any way contributed towards an increased number of genuine sightings. Only four out of the nine post-1960 birds involved either adult birds in winter plumage or immatures; the remainder were adults in summer plumage. However, had the Williamson paper appeared earlier, it might have offered guidance on the identification of a *Chlidonias* sp. at Hornsea Mere on four dates between 28th September and 6th October in 1957. In the Y.N.U. Ornithological Report for 1957, Chislett places the record in square bracketing thus:

> "The notes taken point to this species with very slight discrepancies which may be due to state of moult or individual differences. The three marsh terns in winter or immature plumages are notoriously difficult to identify in the field, and I do not feel able to do more than admit probability."

Even if Chislett had been able to accept the record without qualification, it would serve to reinforce the trend of increased sightings in the county during recent years.

In a review of all records in Britain and Ireland between 1958 and 1967, Sharrock (1974) shows that about eighty-nine individuals were involved. Yorkshire produced five which, despite the county's large size, represents less than five per cent of the total. The majority of the British and Irish records occurred from May to September with peaks during 7th to 20th May and 13th August to 2nd September and were in the South-East of England. The presence of these birds in Britain and the probable reasons for their occurrence, are discussed by Sharrock. It is worth pointing out that there is no local evidence to suggest that this species arrived with Black Terns, *Chlidonias niger*. Indeed, direct evidence to the contrary is suggested by Dickens (*Naturalist*, 1955, p.83), who says that on 9th May 1954 an exceptional number of migrating Black Terns (91 in total) occurred at four inland Yorkshire localities, but no White-winged Black Terns were recorded in the county that year (cf. *British Birds* **64**: 355). With the available data, Sharrock shows that in the period under review, 35 per cent of all birds occurred in spring (before 2nd July), and 65 per cent in autumn (after 2nd July). Of the five Yorkshire individuals recorded in this period (1958-67), two occurred in spring and three in autumn.

Since 1968, the number of White-winged Black Terns accepted by the *British Birds* Rarities Committee (up to and including the committee report for 1974) is as follows: 1968 = 28; 1969 = 16; 1970 = 29; 1971 = 20; 1972 = 12; 1973 = 19; 1974 = 12. Of this total (136), Yorkshire's contribution is less than two per cent. In the exceptional years of 1968 and 1970, when about 56 individuals were recorded in Britain and Ireland, none was recorded in Yorkshire.

Compared with some other parts of the country, notably Kent and other south-eastern counties, Yorkshire's contribution to White-winged Black Tern records in Britain and Ireland in the past seventeen years has not been significant. However, the increased sightings in the county do seem to reflect the national increase of this species in recent years. It must be concluded that Yorkshire is situated on the northerly edge of the species' range both in its post-breeding dispersal from the breeding grounds in Hungary and Poland, and for birds displaced on their northerly spring migration from either east or west African wintering quarters.

ACKNOWLEDGEMENT

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THE LICHENS OF HAREWOOD

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"Now mark the beauties of the chequer'd scene."
— John Jewell, *Ode on Harewood*, 1819.

Despite modern pressures, Harewood House, Park and grounds retain the elements of the grand, the romantic and the rural-idyllic celebrated in Benjamin Greaves' tritely philosophical *Meditations in Harewood Park* published in 1830. Harewood's nearness to Leeds (*c.* 12km to the city centre) and its position on the fringe of the West Yorkshire conurbation (which, as defined in Seaward (1975), has an area of more than 600km^2 and supports a population of more than 1.5 million) invite an examination of its lichen flora in the light of present-day concern with the effects of increasing urbanisation and technology. The area covered in this article is 5.3km^2 (= 1310 acres), and extends to the Leeds-Harrogate road in the east, the Arthington road in the north, Stank Beck, the Lake and their immediate woodlands in the west, and the Sugar Hills boundary wall in the south (see fig. 1).

The mean annual rainfall for the Harewood area is *c.* 760mm (= 30 inches), and the mean daily temperature is *c.* 9°C. Wind-directional data show that winds on either side of the north/south meridian are in the ratio of approximately 3 westerly: 2 easterly (Seaward, 1975, fig. 13). The predominating winds are westerly and south-westerly. The geological composition of Harewood Bank, the northernmost ridge of the Estate (alt. 95m), is Follifoot Grits (Middleton Grit Group of the Millstone Grit Series — see Edwards, *et al.*, 1950). Local stone was therefore available to Edwin Lascelles for the building of Harewood House, the work on which commenced in 1759 to the design of John Carr with modifications by Robert Adam. The building was completed in 1771. The Harewood Bank quarries fell into disuse later when Millstone Grit "passed into serious decline as a building stone" (Raistrick & Illingworth, 1959). These quarries are now heavily wooded or overgrown, and present a poor habitat for lichens. The Park was landscaped by Capability Brown soon after the House was built and, despite the disastrous gales of 1962 which uprooted 20,000 trees, the landscape remains essentially his creation. Further alterations to the House, including the major modification of building the Terrace with its fountain, were completed by Sir Charles Barry in 1850; a comprehensive account of the architectural development is provided in Mauchline (1974). The account below will concentrate on areas of significant interest to the lichenologist.

In the words of John Jewell, the "grand remains" of the Castle's "time-shrunk structure" stand on a high ridge (alt. 80m) of a northern spur of Harewood Bank approximately 75m from the Leeds-Harrogate road. Running from a gateway in the roadside wall close by is a road relaid six years ago, the loosely-consolidated foundations forming one side of a drainage ditch *c.* 1m deep. The mixture of siliceous stones, bricks and cement-aggregate bears *Caloplaca citrina, Lecanora conizaeoides, L. dispersa, L. muralis, L. polytropa, Lecidea tumida, Lecidella scabra, Trapelia coarctata* and *Verrucaria muralis*. Two more noteworthy species, *Micarea denigrata* and *M. violacea* are to be found growing side by side on the semi-shaded faces of a siliceous stone, the former usually lignicolous, and the latter a rare (possibly under-recorded) species with a localised distribution.

Baeomyces rufus occurs lower in the side of the ditch on sandstone. Along the top of the embankment the flat, upper surfaces and sides of several stones show well-developed thalli of an as yet undescribed *Bacidia* sp. (see species list below), previously known in the West

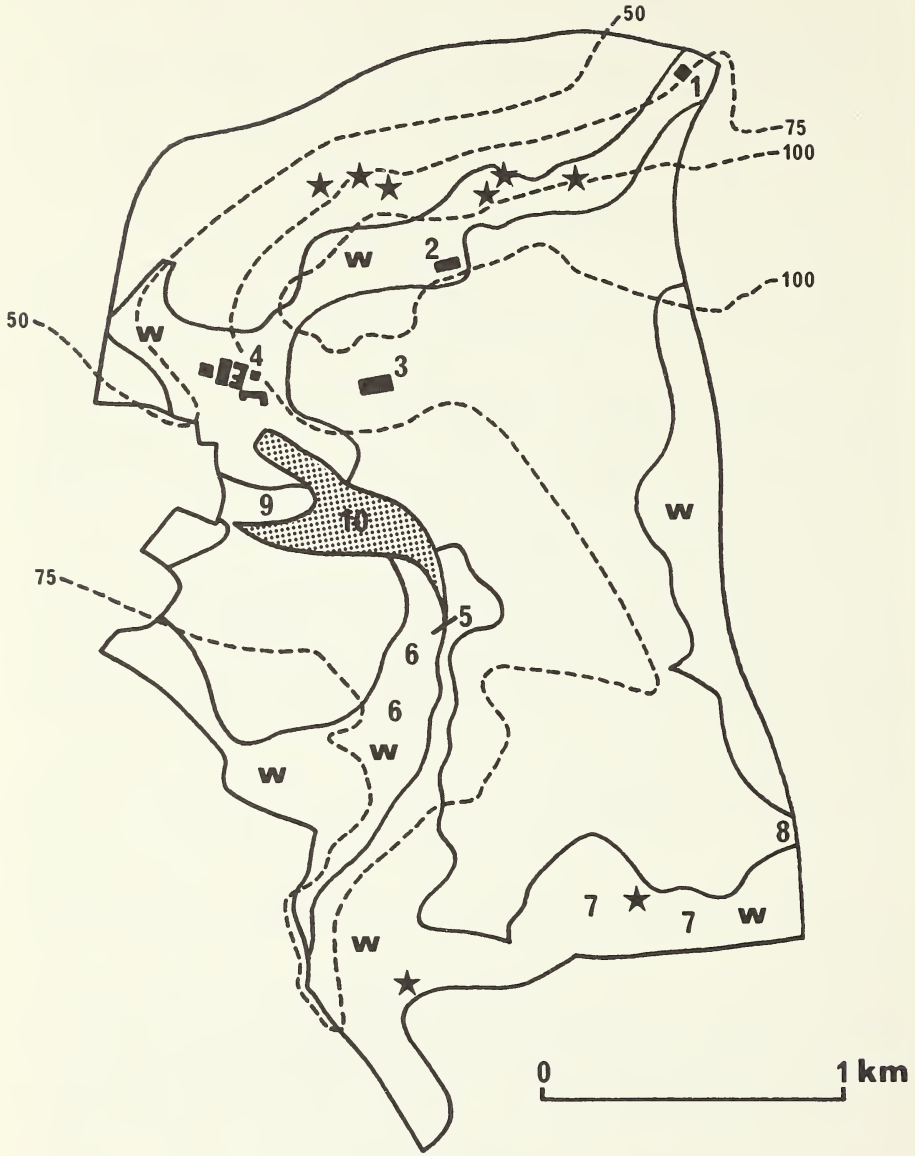


Figure 1
Harewood Park. Area of lichen survey showing wooded areas (w), quarries (*) and contours at 25m intervals (————). 1 = Castle; 2 = Church; 3 = Harewood House; 4 = Home Farm, Stank; 5 = Rough Bridge; 6 = Piper Wood; 7 = Sugar Hills Wood; 8 = Lofthouse Gate; 9 = Kitchen Gardens; 10 = Lake.

Yorkshire conurbation only from a collection at Upper Green, South Morley. *Lecidea erratica* and *Rhizocarpon obscuratum* var. *reductum* are both to be found nearby on siliceous stones, the former a plant commonly found on pebble beaches in south-east England, though it has been collected growing on wood and, more adventurous, on old boot-leather! (B. J. Coppins, *in litt.*). Close by is a pool with a banking of sloping acid sandstone, which affords a typically damp, semi-shaded habitat for *Lecidea semipallens*, an uncommon species with scattered, pale-brown, tuberculate apothecia.

Old tree stumps and fallen branches on the slope to the north of the Castle have extensive coverings of *Lecidea granulosa, L. uliginosa* and *Cladonia coniocraea*. On the very summit of the ridge, small boulders at the base of wooden fencing bear *Trapelia ornata*. The Castle itself supports several species of interest: *Xanthoria aureola* and *X. parietina* flourish high up on the inner side of the tower's north-west wall, and thalli can be seen on the odd fallen stone inside the building. *Cladonia conistea* also grows on a fallen stone. Low on the outer face of the north-west wall, shaded by the surrounding trees and other perennials, are several plants of *Opegrapha confluens*. In one case conjunct thalli form a large irregular diamond-shaped patch, the diagonals measuring 15 and 25cm. A thallus can also be seen on a "bedded" stone nearby. *Opegrapha* species, on either saxicolous or corticolous substrates, have not been recorded from the area previously this century (Seaward, 1975, p. 195).

Church Lane, the old Arthington turnpike road, is now used by heavy traffic as well as private cars, but the roadside walls support a reasonably diverse flora. In addition to several saxicolous species already mentioned, *Acarospora fuscata, Bacidia umbrina, Candelariella aurella, C. vitellina, Lecania erysibe, Lecanora campestris, L. intricata* var. *soralifera, Lecidella stigmatea* and *Parmelia saxatilis* are concentrated on or near the coping stones and mortar, with *Cladonia* spp., *Lecidea granulosa* and bryophytes restricted to the topmost areas, especially where the ground behind rises to coping level (cf. lichen flora of ha-has described below).

Tree-boles in the long-overgrown quarry area to the north of Church Lane bear *Cladonia chlorophaea, C. floerkeana, C. macilenta, Lecidea scalaris* and *Micarea melaena*.

The much-restored, medieval Parish Church of All Saints, less than 1km along the Lane from the village of Harewood, has a thriving, if limited, lichen flora with many of the gravestones (mainly nineteenth century) profusely patched with thalli. One sympathises in this instance with the recent decision to remove *Parmelia saxatilis*, which previously covered over 50% of the topstone of the table-grave of Henry Barrett of Dunkeswick Lodge (d. 1806), to reveal the affecting quatrain:

> "Afflictions sore long time I bore,
> Physicians were in vain,
> Till God above out of his love
> Did ease me of my pain."

Such loosely-attached foliose species effectively obliterate the incised lettering of epitaphs. The more closely adherent subsquamulose/areolate species or crustose ones with varying degrees of thalline immersion in the substrate will usually leave legenda either easily visible or decipherable, as evidenced respectively by the thalli of *Acarospora fuscata* and *Lecanora polytropa* (which tend not to grow into cracks) or those of *L. intricata* var. *soralifera* and *Lecidea tumida* on the Harewood gravestones. In a few cases inscriptions can be highlighted by lichens adapted to growing in this micro-environmental niche. All of these species enhance the churchyard setting, without rendering its record illegible, especially *Lecanora polytropa* with its variation from plants which form extensive black hypothalli to those where the grey-white thalline areolae predominate.

Further along Church Lane lies the descending approach to Home Farm edged on the east by a wall on which grow mainly *Caloplaca citrina, Candelariella aurella, C. vitellina, Lecanora dispersa, L. muralis, Physcia caesia* and *P. orbicularis. Sarcogyne regularis* also occurs occasionally on the mortar here, and *Physcia tenella*, surprisingly little in evidence at Harewood, even on asbestos-cement roofing, can be seen with *P. orbicularis* on the fencing opposite. These species, with the exception of *Sarcogyne regularis*, form a distinctive community which is duplicated on the wooden skirting of a nearby storage barn. Angled at

45° to reach out over the roadside wall coping, this skirting now has a flourishing lignicolous lichen assemblage which is composed, in addition to the above-mentioned species, of *Lecanora dispersa* (= *L. hageni*), *Lecidella scabra* (rare for this substrate), *Rinodina exigua, Xanthoria aureola* and *X. parietina.* Along with *Lecanora muralis,* these latter species are generally not found on decorticate wood, but the extension of their ecological range in this case is most probably encouraged by the heavy dust impregnation and other agricultural eutrophication. The situation is also humid, for close by runs Stank Beck (Stank being appropriately a name derived from the Latin *stagnum*, and the Old French *estang*, "a standing pool").

On the roadside wall ascending from the bridge over Stank Beck towards the Kitchen Gardens, a rich saxicolous flora flourishes with *Acarspora fuscata*, *Bacidia umbrina*, *Caloplaca citrina, C. holocarpa, Candelariella aurella, C. vitellina. Cladonia* spp., *Lecanora conizaeoides, L. dispersa, L. muralis, L. polytropa, Lecidella scabra, L. stigmatea, Parmelia saxatilis, Rinodina subexigua, Verrucaria muralis* and *V. nigrescens* common, *Haematomma coccineum* var. *porphyrium, Lecanora atra, Ochrolechia parella* and *Pertusaria albescens* var. *corallina* (rare for this substrate) occasional, and a single thallus of *Physcia tenella.* The saxicolous lichens of the coping-stones of the siliceous walls in and around Home Farm and Stank are very often heavily infested by the collembolan *Hypogastura tullbergi.*

At the end of the Stank Beck stretch of wall, a corrugated asbestos-cement roof over a garage has a Xanthorion community covering it. Two particularly interesting species found here are *Xanthoria elegans* and several thalli of *Caloplaca decipiens.* both uncommon, but increasing in occurrence, in the Leeds area (Seaward, 1975). *Xanthoria elegans*, a decorative species with a world-wide distribution, has the distinction of being recorded from the extreme elevation of 7000m on Mt. Karakorum (Gams, 1960).

At the southern end of the Lake, by the Rough Bridge over the weir, the flat upper surface (*c.* 0.25m² in area) of a siliceous boulder is monopolised by *Cladonia conistea.* This and the chemically-separable *C. conista* are under-recorded, but *C. conistea* appears to be generally distributed in and around Leeds (cf. Seaward, 1975, p. 185).

Although Harewood has a total length of ha-ha walling of at least 5km, the lichen flora of this habitat is in general disappointing. *Lecanora conizaeoides* and *Lepraria incana* are very common, and *Lecanora dispersa* and *Verrucaria muralis* are frequent on the mortared crevices. *Cladonia* spp., *Lecidea granulosa* and *L. uliginosa* commonly intrude on the copings which are level with the ground to one side. The lichen flora of the other stonework is greatly influenced by the excretory habits of the cattle grazing there. By the ha-ha to the east of the House, the ditch embankment has projecting aggregate stone and brick supports which hold collectively a community almost identical with that on the wall dipping down into Home Farm (see above), with the addition of *Lecanora campestris, L. conizaeoides, L. polytropa, Lepraria incana* and *Verrucaria muralis.* The most distinctive community of any ha-ha, however, is that found on the north-west-facing bend of the wall running primarily south-west from the Lofthouse Gate, where, along with *Parmelia saxatilis*, both *Platismatia glauca* and *Cystocoleus niger* thrive. This is the nearest known site to the centre of Leeds for *Platismatia glauca*, a geographically-interesting lichen with clearly defined ecological limits in respect of man-influenced environments (see fig. 2). *Cystocoleus niger*, a plant of shady crevices and overhangs, is of infrequent occurrence in the West Yorkshire conurbation area. *Cladonia floerkeana, C. furcata* and *C. squamosa* are also to be found on this reach of the ha-ha.

The general poverty of corticolous lichens in the area is apparent, but a decrepit elder in the lakeside stretch of Piper Wood bears *Cladonia coniocraea, Hypogymnia physodes* and *Lecidea scalaris* to complement the ubiquitous *Lecanora conizaeoides* and *Lepraria incana* which are the only species on most other trees. It may be significant that where *Hypogymnia physodes* is found on bark at Harewood it is either at the base of old tree boles or on damaged trees. The only flourishing group of corticolous thalli observed is some distance to the south of the Estate in Sugar Hills Wood on the base of an old oak. It seems most likely that *H. physodes* would be present in more such ecological niches at Harewood but for the havoc

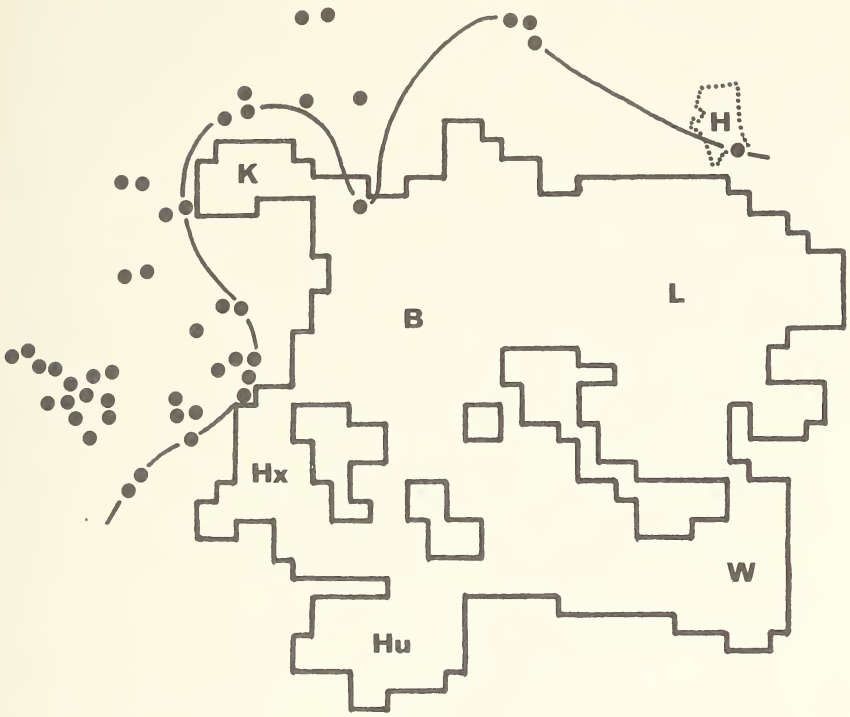


Figure 2
Distribution of *Platismatia glauca* relative to the West Yorkshire conurbation as delimited by Seaward (1975). B = Bradford; H = Harewood Park; Hu = Huddersfield; Hx = Halifax; K = Keighley; L = Leeds; W = Wakefield.

wrought on old trees by the 1962 gales. Also in Sugar Hills Wood, a decorticate fence-strut, its upper surface liberally crusted with *Lecanora conizaeoides*, bears a few associated thalli, the largest measuring 2cm², of *Biatorella moriformis*, a taxon previously unrecorded from the West Yorkshire conurbation and a close relative of *B. pinicola* from which it differs mainly in epithecial pigment. *B. moriformis* similarly accompanies *Lecanora conizaeoides* upon wooden fencing near a watering-trough in the Castle Plantation. On the same palings thalli of *Micarea denigrata* are interspersed amongst *Lecanora conizaeoides*, the two species intermingling particularly where they share the cross-grain tops of two uprights.

The lichen flora of the Estate has long been greatly influenced by air pollution, emanating from the urban and industrial complex to the south-west and carried on the prevailing winds. A more detailed account of the technological pressures, and the associated deterioration of the lichen flora within the region as a whole since the onset of the Industrial Revolution is given in Seaward (1975). Two early references to the undoubted influence of air pollution on the area at present under consideration may be quoted: after visiting Harewood, Prince von Pückler-Muskau (1832) noted on the drive into Leeds, "I reached the great manufacturing town of Leeds just in the twilight. A transparent cloud of smoke was diffused over the whole space which it occupies, on and between several hills; a hundred red fires shot upwards into

the sky, and as many towering chimneys poured forth columns of black smoke". "The town itself" he found to be "enveloped in an everlasting fog produced by the smoke, which never ceases day nor night." Similarly, Roberts (1882), in a diary entry for 1874, describing the view from the top of Kirkby Overblow church tower wrote, "Southward, over Harewood, the smoke of Leeds ascends, forming a dingy perpetual cloud". Fortunately there have been considerable improvements in air quality following the implementation of the Clean Air Act of 1956 by the progressive establishment of smokeless zones throughout the West Yorkshire conurbation. The reduction in smoke concentration has also brought about a corresponding decrease in sulphur dioxide levels by the removal of particulate matter which provides adsorption surfaces for the gas. This and the more efficient dispersion of industrial pollutants have, however, increased background levels of sulphur dioxide in many rural areas, and the reduction of this pollutant at Harewood, for example, has been significantly less since 1956 than in neighbouring urban areas.

Mean daily sulphur dioxide figures (annual and winter) obtained from six National Survey gauges sited in the northern suburbs and centre of Leeds (within 6 to 9 km and to the south

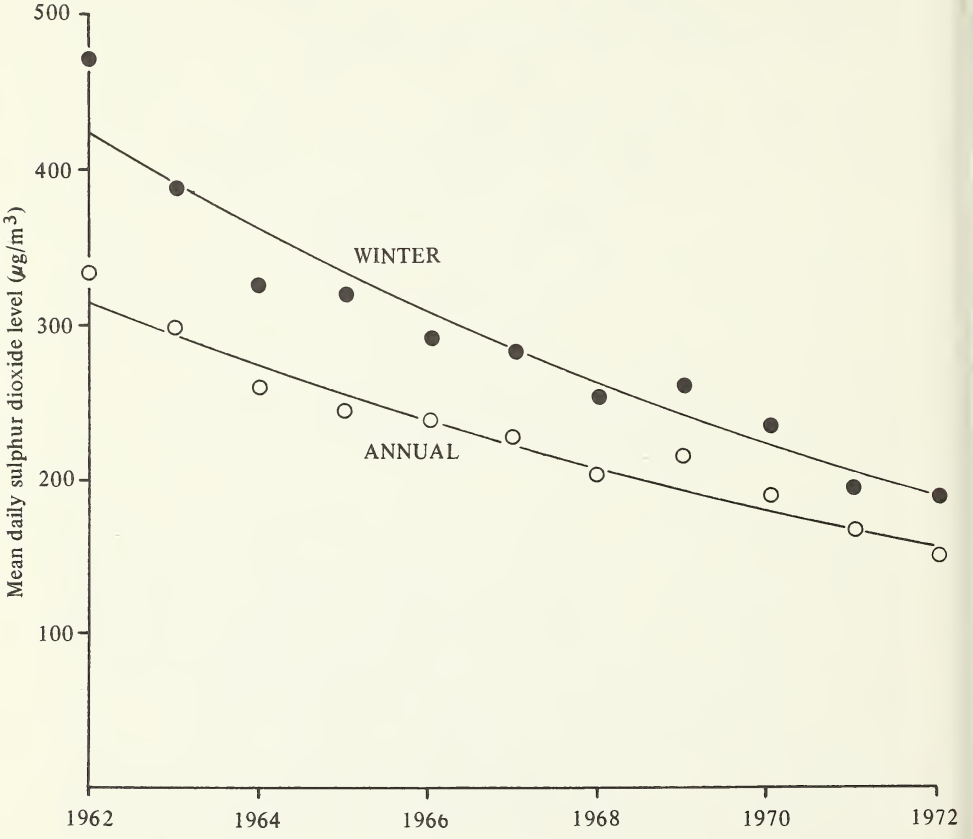


Figure 3
Annual and winter mean daily sulphur dioxide figures for the period 1962 to 1972 from six National Survey sites in Leeds.

and south-west of Harewood) show a dramatic fall between the period 1962 and 1965 and a less significant fall since that date (fig. 3). Mean daily sulphur dioxide concentrations of 150 and 130$\mu g/m^3$ have been computed for the Harewood area for the periods 1962-65 and 1969-72 respectively (Seaward, 1975, fig. 15) and mean daily concentrations for the winter months are 200 and 160$\mu g/m^3$ for the same periods respectively.

The dominant corticolous lichen flora of Harewood is representative of zones 2 and 3 on the qualitative scale for the estimation of sulphur dioxide air pollution in England and Wales (Hawksworth and Rose, 1970), with a few areas, e.g. Piper Wood, representative of zone 4 on this scale. Zones 2 and 3 reflect mean winter values of *c.* 125-150$\mu g/m^3$ and zone 4 is indicative of *c.* 70$\mu g/m^3$. The saxicolous lichen flora typifies an ambient atmosphere of significantly lower levels than those quoted above (cf. Gilbert, 1970; Seaward, 1975). It would appear that the status of the corticolous species is indicative of past levels, whilst that of the saxicolous species, with superior powers of re-colonization, is indicative of more recent conditions; in both cases the concentrations are lower than those computed from National Survey data.

The following flora lists only those taxa, 69 in number, recorded strictly within the 5.3km^2 area defined above (fig. 1) since the commencement of the survey in April 1974. Ecological and distributional data, with some indication of frequency, are provided together with morphological notes on the more interesting and/or critical material. Records are substantiated in many instances by herbarium specimens housed in the collections of A. Henderson, M. R. D. Seaward and the Royal Botanic Garden, Edinburgh (abbreviated to Herb.AH, Herb.MRDS and Herb.E respectively in the list. Records additional to Seaward (1975) are signified by an asterisk. Nomenclature is based mainly on James (1965, 1971) and widely-used synonyms are cross-referenced.

Species List

Acarospora fuscata (Nyl.) Arnold Saxicolous. Nitrophilous. Frequent. On old stonewall copings and gravestones.

Bacidia melaena see *Micarea melaena*.

B. umbrina (Ach.) Saxicolous. Occasional. On stone walls, mortar and concrete.

**B.* sp. Saxicolous. Uncommon. On siliceous stones over a short stretch of ditch embankment, near Castle. (Herb. E; Herb. AH 1761). "An apparently undescribed species belonging to the *B. inundata* group. It resembles *B. egenula* and *B. arnoldiana* with its sorediate thallus and substrate preferences, but differs in having pinkish-brown apothecia with a colourless hypothecium. The upper part of the exciple margin is a reddish-brown which assumes a purple tinge in KOH. The hymenium is similarly, but less intensively, pigmented. It appears to be a common, although easily overlooked species, of shaded calcareous rocks and walls." (B. J. Coppins, *in litt.*)

Baeomyces rufus (Huds.) Rebent. Saxicolous. Uncommon. On "bedded" sandstone in ditchside, Castle Plantation. (Herb. AH 1748).

**Biatorella moriformis* (Ach.) Th. Fr. Lignicolous. ?Nitrophilous. Uncommon. On the top of wooden fence uprights and horizontal palings near cattle watering-trough, Castle Plantation; on a wooden fence-strut by gate, Sugar Hills Wood. (Herb.E; Herb.AH 1736, 1769; Herb.MRDS 101106).

Caloplaca citrina (Hoffm.) Th. Fr. Lignicolous and saxicolous. Common. On asbestos-cement, mortar of walls and concrete; only occasional on acid stone and decorticate wood.

C. decipiens (Arnold) Jatta Saxicolous. Uncommon. On corrugated asbestos-cement roofing of garage, near Kitchen Gardens.

C. holocarpa (Hoffm.) Wade Saxicolous. Occasional. On corrugated asbestos-cement roofing, Stank; on concrete supports in ha-ha embankment; on mortar of walls. (Herb. MRDS 100438).

Candelariella aurella (Hoffm.) Zahlbr. Saxicolous. Calcicolous. Common. On mortar of walls, concrete and asbestos-cement.

C. vitellina (Hoffm.) Müll. Arg. Lignicolous and saxicolous. Nitrophilous. Common. On wooden skirting of storage-barn, Home Farm; on walls, asbestos-cement and concrete.

Cetraria glauca see *Platismatia glauca.*

Cladonia chlorophaea (Flörke ex Sommerf.) Spreng. Corticolous and terricolous. Common. On acid soils, tree-boles and decaying wood.

C. coccifera (L.) Willd. Terricolous. Frequent. On acid, peaty soils. (Herb.MRDS 100488).

C. coniocraea (Flörke) Spreng. Corticolous, lignicolous and terricolous. Common. On acid soils, tree-boles, rotting wood and on ha-ha walls, usually concentrated around copings and cushioned on soil.

C. conistea (Del.) Asah. Saxicolous. Uncommon. On siliceous boulder above weir, Rough Bridge; on sandstone block in Castle. (Herb. AH 1727). All material contains atranorin.

C. fimbriata (L.) Fr. Corticolous, saxicolous and terricolous. Frequent. Roots of trees, wall-copings, banks, etc. (Herb.MRDS 101149).

C. floerkeana (Fr.) Sommerf. Corticolous and terricolous. Occasional. On old tree-roots; on ha-ha wall-coping, north of Sugar Hills Wood; in disused quarry, now rough pasture-land (Herb.AH 1710).

C. furcata (Huds.) Schrad. Terricolous. Uncommon. On coping of ha-ha wall, cushioned on soil and among bryophytes, overlooking pasture north of Sugar Hills Wood.

C. macilenta Hoffm. Terricolous. Frequent. On acid, peaty soils.

C. polydactyla (Flörke) Spreng. Corticolous and terricolous. Occasional. On acid, peaty soils and decaying wood.

C. squamosa (Scop.) Hoffm. Terricolous. Uncommon. On soil over ha-ha wall-coping, near Lofthouse Gate.

Cystocoleus niger (Huds.) Hariot Saxicolous. Occasional. On north-facing ha-ha wall on northern boundary of Castle Plantation; locally frequent on similarly placed ha-ha wall overlooking pasture north of Sugar Hills Wood. (Herb.AH 1731, 1767; Herb.MRDS 100455).

Haematomma coccineum var. *porphyrium* (Pers.) Th. Fr. Saxicolous. Rare. On capstone of roadside wall, near Stank.

Hypogymnia physodes (L.) Nyl. Corticolous and saxicolous. Occasional. Locally frequent on an old oak-bole, Sugar Hills Wood, and with *Cystocoleus niger* on the north-facing ha-ha wall, Castle Plantation boundary; on elder, Piper Wood.

Lecania erysibe (Ach.) Mudd Saxicolous. Calcicolous. Frequent. On mortar, especially of roadside and pathside walls, and on asbestos-cement.

**L. nylanderiana* Massal. Saxicolous. Rare. On mortar of south-west-facing wall of old alley-way from village to Castle. Specimen in Herb.E with unusually non-pruinose apothecia not reaching their full potential, and with the 3-septate spores smaller than normal, 11-14 × 3.5-4μ, the thalline margin more persistent than in *L. erysibe.*

Lecanora atra (Huds.) Ach. Saxicolous. Uncommon. On roadside wall capstone, near Stank.

L. badia (Hoffm.) Ach. Saxicolous. Uncommon. On horizontal gravestone in churchyard.

L. campestris (Schaer.) Hue Saxicolous. Calcicolous. Frequent. On mortar and mortar-contacts of old walls, Church Lane and Stank; less common on concrete supports in ha-ha embankment near Lake. (Herb. AH 1706).

L. conizaeoides Nyl. ex Cromb. Corticolous, lignicolous and saxicolous. Abundant. On trees, rocks, walls, etc.

L. dispersa (Pers.) Sommerf. Lignicolous and saxicolous. Abundant. On mortar, concrete and asbestos-cement; occasional on siliceous stones, Castle Plantation; on wooden barn-skirting, Home Farm (= *L. hageni* — Herb.MRDS 101073).

L. intricata var. *soralifera* Suza Saxicolous. Frequent. On acid walls and rocks; on churchyard gravestones.

L. muralis (Schreb.) Rabenh. Lignicolous and saxicolous. Common. On mortar, concrete, asbestos-cement and siliceous wall copings; on wooden barn-skirting, Home Farm. (Herb.AH 1717).

L. muralis var. *albomarginata* (Nyl.) Tomin Saxicolous. Rare. On flat upper surface of siliceous stone in ditch embankment near Castle. (Herb.AH 1750).

L. polytropa (Hoffm.) Rabenh. Saxicolous. Frequent. On rocks and walls, especially copings and horizontal surfaces; on gravestones in churchyard.

Lecidea coarctata see *Trapelia coarctata.*

L. coarctata var. *ornata* see *Trapelia ornata.*

**L. erratica* Körb. Saxicolous. Uncommon. On "bedded" siliceous stones on shoulder of roadside ditch near Castle. "Usually a pebble or loose stone species, particularly common on the shingle beaches of south-east England and on flint stones in dry heathland, e.g. in the New Forest." (B. J. Coppins, *in litt.*). (Herb.AH 1747).

L. granulosa (Hoffm.) Ach. Corticolous and terricolous. Acidophilous. Common. On damp soil and tree-stumps, among soil and bryophytes on ha-ha wall copings, etc.

L. lucida (Ach.) Ach. Saxicolous. Acidophilous. Occasional. In or near wall crevices, e.g. old stone byre by edge of Sugar Hills Wood; extensive patches on shaded corner of high brick wall, Kitchen Gardens.

L. scabra see *Lecidella scabra.*

L. scalaris (Ach.) Ach.) Corticolous. Uncommon. On old deciduous tree-boles in rough pastureland (overgrown quarry) north of Church Lane; on decrepit elder by Lake in Piper Wood. (Herb.AH).

**L. semipallens* Nyl. Saxicolous. Rare. On sandstone banking by pool, Castle Plantation. (Herb.AH 1762).

L. stigmatea see *Lecidella stigmatea.*

L. sulphurea (Hoffm.) Whanlenb. Saxicolous. Uncommon. On roadside walls.

L. tumida Massal. Saxicolous. Common. On rocks, walls, gravestones, etc.

L. uliginosa (Schrad.) Ach. Corticolous, lignicolous and terricolous. Frequent. In damp woodlands, especially on decaying tree-stumps.

Lecidella scabra (T. Tayl.) Hert. & Leuck. Lignicolous and saxicolous. Frequent. On siliceous rocks and roadside walls; on wooden barn-skirting. (Herb.AH 1718; Herb. MRDS 101074).

L. stigmatea (Ach.) Hert. & Leuck. Saxicolous. Calcicolous. Frequent. On mortar of walls, concrete and asbestos-cement.

Leparia incana (L.) Ach. Corticolous, lignicolous, saxicolous and terricolous. Very common. On various substrates in shaded, often damp, habitats.

**Micarea denigrata* (Fr.) Hedl. Lignicolous and saxicolous. Rare. On fencing by watering-trough, and growing with *M. violacea* on a siliceous stone in ditchside embankment, Castle Plantation. (Herb.E.). "This species is normally lignicolous. It differs from the other common 1-septate spored *Micarea*, *M. prasina* Fr., in its non-leprose thallus, relatively narrower spores (9-12 × 2-2.3μ in this collection) and C+ red reaction of the ascocarp section of the thallus (reactions tested under slide at × 100)." (B. J. Coppins, *in litt.*).

M. melaena (Nyl.) Hedl. Corticolous. Uncommon. On old tree-stump in rough pastureland, north of Church Lane. (Herb.MRDS 100461).

**M. violacea* (Crouan ex Nyl.) Hedl. Saxicolous. Uncommon. On siliceous stones in ditch embankment. (Herb.E).

Ochrolechia parella (L.) Massal. Saxicolous. Rare. Several thalli on coping of roadside wall running south from Stank bridge.

**Opegrapha confluens* (Ach.) Stiz. Saxicolous. Rare. In shade at base of Castle tower wall and on "bedded" stone nearby. P. W. James *(in litt.)* gives the following reasons for this determination: ". . . the relatively poorly developed thallus, the tendency for the lirellae to become more or less massed into contorted groups and the acid nature of the substrate. Furthermore, the base of the exciple is much thicker than in either *O. chevallieri* or *O. saxatilis.* This complex of species is extremely difficult to determine, particularly when the material is polluted or slightly abnormal as is your specimen." (Herb.AH 1741; Herb. MRDS 101151).

Parmelia physodes see *Hypogymnia physodes.*

P. saxatilis (L.) Ach. Saxicolous. Common. On walls, particularly copings; also on boulders and churchyard gravestones.

Pertusaria albescens var. *corallina* (Zahlbr.) Laund. Saxicolous. Rare. On capstone of roadside wall near Stank; this variety is usually corticolous. (Herb.MRDS 100475).

Physcia caesia (Hoffm.) Hampe Lignicolous and saxicolous. Nitrophilous. Locally common. On wooden barn-skirting, Home Farm; on corrugated asbestos-cement roofing. Stank; on concrete supports in ha-ha embankment near Lake.

P. orbicularis (Neck.) Poetsch Lignicolous and saxicolous. Nitrophilous. Locally common. On wooden barn-skirting, Home Farm, and on wooden fencing and stone copings nearby; on asbestos-cement and concrete. (Herb.MRDS 101072).

P. tenella (Scop.) DC.em.Bitt. Lignicolous and saxicolous. Occasional. On wooden barn-skirting and wooden fence, Home Farm; on corrugated asbestos-cement roofing near Kitchen Gardens; uncommon on mortar of roadside walls. (Herb.MRDS 101069).

Platismatia glauca (L.) Culb. & Culb. Saxicolous. Uncommon. Numerous thalli on north-facing stretch of ha-ha wall near Lofthouse Gate. (Herb.AH 1734).

**Rhizocarpon obscuratum* var. *reductum* (Th. Fr.) Eitner Saxicolous. Rare. On side of siliceous stone in ditchside, Castle Plantation. (Herb.AH 1749).

Rinodina exigua (Ach.) Gray Lignicolous. Rare. On wooden barn-skirting, Home Farm. (Herb. MRDS 101070).

R. subexigua (Nyl.) Oliv. Saxicolous. Mainly calcicolous. Frequent. On roadside walls; on siliceous stones on shoulder of ditch, Castle Plantation.

Sarcogyne regularis Körb. Saxicolous. Locally frequent. On mortar and concrete near Home Farm and in ha-ha by Lake. (Herb.AH 1722).

Thelidium cf. *mesotropum* (Nyl.) A.L.Sm. Saxicolous. Uncommon. This taxon, with its tiny black perithecia and often evanescent or endolithic thallus, has been overlooked; but over the last two years it has been collected from several local sites including the aggregate topping of a stone bollard above a narrow alleyway only *c*. 2km from the centre of Leeds. It also occurs in other unlikely habitats, e.g. "on an old brick in a hedgerow between two arable fields in Durham" (B. J. Coppins, *in litt*.). (Herb.MRDS 100899).

Trapelia coarctata (Sm.) Choisy Saxicolous. Common. On siliceous and calcareous substrates; highly polymorphic with some "forms" tending towards the next species.

T. ornata (Sommerf.) Hertel Saxicolous. Uncommon. On siliceous stones at base of fence on brow of Harewood Bank, near Castle. (Herb.AH 1702).

Verrucaria muralis Ach. Saxicolous. Common. On mortar and stone of walls; on concrete, boulders and brick.

V. nigrescens Pers. Saxicolous. Common. On mortar and stone of walls; also on boulders.

V. viridula (Schrad). Ach. Saxicolous. Occasional. On mortar of south-facing boundary wall and on weakly calcareous stonework, Sugar Hills Wood. (Herb. MRDS 101071).

Xanthoria aureola (Ach.) Erichs. Lignicolous and saxicolous. Locally frequent. On wooden barn-skirting, Home Farm; on corrugated asbestos-cement roofing near Stank; on wall of Castle tower. (Herb.AH 1704).

X. elegans (Link) Th. Fr. Saxicolous. Rare. On corrugated asbestos-cement roofing of garage near Kitchen Gardens. (Herb.AH 1724).

X. parietina (L.) Th. Fr. Lignicolous and saxicolous. Locally common. On wooden barn-skirting, Home Farm; on walls and asbestos-cement.

Acknowledgements

Our thanks are due to the Earl of Harewood for permission to carry out this survey, and to Mr. N. Ussher and Mr. B. J. Coppins for the generous help and information we have received. We would also like to thank Mr. B. J. Coppins, Mr. P. W. James and Dr. T. D. V. Swinscow for the determination and/or confirmation of critical material and for valuable notes on some taxa.

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MAMMAL AND LOWER VERTEBRATE REPORTS FOR 1974

MAMMALS (C. A. Howes)

Due to increasing financial pressures placed on the Union by escalating printing costs, the annual mammal report will no longer follow the usual pattern of publishing abstracts, species by species, of the year's intake of records. Instead, important highlights and trends will be written up as 'short notes' in the *Naturalist* and periodic reviews of records will appear as full-length articles from time to time. Records received annually will of course continue to be placed on file and made use of in the usual ways, e.g. the provision of data for distributional studies: the mammal mapping schemes of the Y.N.U. and of the Biological Records Centre, and the National harvest mouse and otter surveys. Furthermore, papers on black rats, mountain hares, harvest mice, otters, stoats, weasels and bats in Yorkshire are currently on the stocks, being produced mainly as reference material for the long-awaited monograph on the *Mammals of Yorkshire* (VC's 61-65) which the Mammals and Lower Vertebrates Section of the Y.N.U. is presently planning. With this in mind, there is still enormous scope for district or single species studies and I would welcome any requests for information for such ventures.

As in 1973 this was a year of almost frenzied recording by some. The local society and museum sponsored surveys and recording schemes provided well over a thousand records. With the larger societies now working to produce their own annual reports e.g. Bradford, Castleford, Harrogate, Sheffield and Scarborough, there is now extra incentive for members to make available their observations. Consequently many previously unworked districts are now well recorded.

Highly productive owl pellet work (some revealing yet more harvest mouse sites) has been carried out on material from Adwick-le-Street 44/50, Austerfield 43/69, Armthorpe 44/60,

Sutton 44/51, Eggborough 44/52, South Elmsall 44/41, Ledsham and Ledston 44/42 and Elbolton 00/60 by C. A. Howes, and Brompton 44/98, East Ayton 44/78, Hutton Buscal 44/98, Muston 54/07 and Sherburn Ings 44/98 and 44/97 by C. I. Massey. The recording of the remains of small mammals trapped in discarded bottles, drinks cans, etc. featured in the work of C. I. Massey and F. J. Thompson in the Scarborough district. Ambitious bottling expeditions by Derek Whiteley and Shan Blagden along the hedge bottoms, lay-bys and rubbish tips in the Sheffield area yielded large numbers of new records and some useful statistics on relative abundance of small mammals. It also added considerably to the mammal records submitted on behalf of the Sorby Natural History Society. Mammal trapping was again organised in the Bradford area by Margaret Hartley providing data from ten km squares 44/22, 44/23, 44/13, 44/14, and 44/03. Trapping records were also sent in by M. J. A. Thompson from Askern Bog 44/54, Moorlands 44/55 and Reeth 44/09. Fox dropping work continued on Spurn Peninsula, 54/41 and on Thorne and Crowle Moors 44/71 — reports on which will be submitted to the *Naturalist* in due course.

A highlight of 1974 was the publication of *Badgers of Yorkshire and Humberside* by Richard Paget and Adrian Middleton, perhaps the most important work ever written on a Yorkshire mammal (see *Naturalist* 1975, p.76).

I would like to thank the following for forwarding records during 1974: D. McAndrew, S. Blagden, J. Bland, H. Booth, J. Cameron, J. Day, J. Flint, G. Gott, W. Gott, M. Hartley, P. Higgins, D. Hird, M. Limbert, C. I. Massey, L. Magee, T. G. Manby, O. Morton, M. G. Priestley, M. J. Puddy, T. Riley, P. Robinson, C. Slater, E. Starkey, F. J. Thompson, M. J. A. Thompson, J. Watson, D. Whiteley, J. E. Wilkinson, C. Wright.

AMPHIBIANS AND REPTILES (M. J. A. Thompson)

This annual report, at the request of the Editor, is shorter and is different in its layout; and yet, I hope, is not without its interest. During the year I received 222 individual records, all of which were entered on the B.R.C. pink record cards and sent on to Monks Wood Biological Records Centre. I only received one from East Yorkshire (VC 61). Under the new 10km × 10km recording scheme, for the 12 squares for the palmate newt *(Triturus helveticus)*, 9 were newly worked areas mainly in upland Yorkshire. All the slow worm records were from north-west Yorkshire. There were no reports of alien species in the county for 1974. An analysis of the 222 records is as follows:

	Individual	10km grid squares for 1974	New grid squares for 1974
Triturus vulgaris.	17	8	1
T. cristatus.	8	7	1
T. helveticus.	14	12	9
Rana temporaria.	71	28	6
Bufo bufo.	50	25	7
Lacerta vivipara.	17	14	7
Anguis fragilis	14	9	2
Vipera berus.	13	10	4
Natrix natrix.	18	11	4

The new 1970-74 10 kilometre square records, as well as the recently surveyed areas, are listed below:

1. Smooth Newt *(Triturus vulgaris)* Huntington, near York, (MJAT) 44/65; of interest, the lake at the Open Air Theatre, Scarborough, (C.I.M.) where they are described as very common 54/08.

2. Great Crested Newt *(T. cristatus)* Queen Mary's Dubbs, Ripon Parks, (C. Slater & D. McAndrew) 44/37; of interest, Moor Monkton, (I. E. Packington) 44/55.

3. Palmate Newt *(T. helveticus)* Seven Hills, Stainmoor at 1300ft. (C.S) 45/91; Langthwaite, Arkengarthdale at 800ft. — a colony of 30 adults (M.J.A.T.) 45/00; Wilton Ponds, near Middlesborough (J.K.) 45/51; Hayburn Wyke, Y.N.T. Reserve at 25ft. (B.W.)

54/09; Masham (C.S.) 44/28; Wharncliffe 43/39; White Lee Moor (D.W.) 43/29 and Rivelin (D.W.) 43/38; Rivelin Valley (P. Hayes) 43/28.

4. Common Toad *(Bufo bufo)* Langthwaite, Arkengarthdale at 800ft., tadpoles, (M.J.A.T.) 45/00; Robin Hoods Bay, (T. Webb) 45/90; Queen Mary's Dubbs, Ripon Park, thousands of tadpoles, (C. Slater & D. McAndrew) 44/37; Wombleton, nr. Kirbymoorside, (M.J.A.T.) 44/68; Fairburn Ings, (J.H.F.) 44/42; Rivelin, (R. Binks) 43/28; Shireoaks, (A. Brackenbury) 43/58; of interest New Millardam, Wakefield, (J. Watson) 44/31; Throxenby Mere, 720 toads killed on roadside during the Spring 1974, (C.I.M.) 54/08.

5. Common Frog *(Rana temporaria)* Gisburn Forest and Ben Rhydding, (M.V.B.) 44/14; Redmire, (K. Clarkson) 43/28; Queen Mary's Dubbs, Ripon Park, (C. Slater & D. McAndrew); 44/37; Totley, (Mr. Warburton) 43/37; Long Plantation, Filey, (F. J. Thompson) 54/18; Askham Bog, Y.N.T. Reserve, (M.J.A.T.) 44/57.

6. Common Lizard *(Lacerata vivipara)* Dallowgill, nr. Pateley Bridge, (C.S.) 44/16; Lindley Wood, nr. Leeds, (J.H.F. and M.V.B.) 44/24; Scotch Corner, Old Stead, (N.S.) 44/58; Carlton, Hemsley, (J.H.F.) 44/68; Hunmanby Gap, (P. Winter) 54/17; Olivers Mount, Scarborough, (C.S.) 54/08; Outbridge, nr. Sheffield, (A. Brackenbury) 43/39.

7. Slow Worm *(Anguis fragilis)* Raincliffe Woods, Forge Valley, (B.W.) 44/98; Scotch Corner, Old Stead, (N.S.) 44/58.

8. Adder *(Vipera berus)* Seven Hills, Stainmoor at 1300ft., (C.S.) 35/91; West Scrafton at 1000ft., (J.N.F.) 44/08; Scotch Corner, Old Stead at 800ft., (N.S.) 44/58; Osgodby Cutts, Scarborough, (C.S.) 54/08.

9. Grass Snake *(Natrix natrix)* Bradford golf course, (M.H.) — killed, possibly an escapee, 44/13; Tinsley sewage farm, (J. L. Smith) 43/41; Ewden Valley, (T. Preston) — Little Don Valley 43/29; Longhorn Wyke, (J. Webb 54/09 — an escapee, now seem well established in area; of interest, Escrick Park, (C.S.) 44/64.

Records were received from: M. V. Bell, J. H. Flint, M. Hartley, C. A. Howes and Doncaster Museum Records, J. Knight, D. McAndrew, C. I. Massey and Scarborough Natural History Society, I. E. Packington, T. H. Riley and Sheffield Museum Records, C. Simms, C. Slater, N. Snowden, B. Walker, S. Warburton, D. Whiteley and Sorby Natural History Society, S. Worwood, as well as my own. I also received records for 1973 from R. Dickins and members of the Castleford Natural History Society, L. McGee and the Bradford Natural History Society, and Mr. Jon Watson for 1970-74 from the Wakefield area.

MARINE FISHES (C. I. Massey)

The species listed are all either rare, or of unusual occurrence, or at the northern limit of their distribution in the North Sea:

Porbeagle *(Lamna nasus)* (61) 120lb netted off Filey by local boat; *Angling Times*, 27/7/74. (62) 224lb plus caught in net of 'Progressive' a few miles of Scarborough, 15/10/74; *Scarborough Evening News*, 16/10/74.

Basking Shark *(Cetorhinus maximus)* (61) 18′ stranded between lighthouse and South Landing, Flamborough; *Yorkshire Evening Press*, 18/5/74.

Tadpole Fish *(Raniceps raninus)* (62) Crab pott off Scalby Mills, Scarborough, 5/7/74 and 20/7/74; C.I.M.

Bass *(Dicentrarchus labrax)* (61) 3 from 2½ — 6lb, rod and line off beach, Reighton Gap, Filey Bay; *Angling Times*, 21/2/74. 8½lb, rod and line off beach, Aldbrough; *Angling Times*, 16/5/74.

Ray's Bream *(Brama brama)* (61) 5lb, rod and line off beach, Filey, 6/9/74. 4lb 13oz, stranded Hunmanby Gap, 20/11/74. At least 21 in various stages of decomposition stranded on Filey Sands, 26/11/74; C.I.M. (62) One reported as '24″, Whitby last week'; *Whitby Gazette*, 11/10/74. Around 4lb stranded South Gare; *Angling Times*, 31/10/74. 5lb stranded North Bay, Scarborough, 21/11/74. 3 stranded, South Bay, Scarborough, 28/11/74. 4lb 10½oz stranded North Bay, Scarborough, 1/12/74. Remains of two found stranded N. end Jackson's Bay, Scarborough, 1/12/74 and 9/12/74; C.I.M. 4½lb caught rod and line off beach, Sandsend; *Whitby Gazette*, 6/12/74.

FIELD NOTES

Apium repens (Jacq.) Lag. **and** *A. nodiflorum* (L.) Lag. x *A. repens* (Jacq.) Lag. **in the East Riding.**

On August 12th, 1975 I found the hybrid *Apium nodiflorum* x *A. repens* in a meadow by the side of Hornsea Mere. Specimens collected a fortnight later were identified by R. D. Meikle of Kew who informed me that *A. repens* is only now known in Britain in Ports Meadow, Oxford where there are few plants; the hybrid is very common in the same Oxford meadow and it also occurs in Suffolk, Norfolk, Midlothian and Fife.

At Hornsea, plants of the hybrid are growing on marshy ground by the side of a recently cut dike, a few yards from a reed bed at the mere edge. *A. nodiflorum* was seen growing in the shallows at the mere edge some three hundred yards away. A further search of the area is required to discover whether *A. repens* is also present or not.

I was aware that *A. repens* had been recorded for the 'line ponds' at Skipwith Common in the last century by Lees (Cheetham, C.A. & Sledge, W.A., ed., 1941, *A Supplement to the Yorkshire Floras*, p.52), however, in the *Atlas of the British Flora* (Perring, F.H. & Walters, S.M., ed., 1962) there are two Yorkshire localities (grid squares 44/63 and 44/46) for *A. nodiflorum* x *A. repens*. The 44/63 dot presumably represents Lees' record for the rare species. The question then arose as to whether Lees' Skipwith specimens of *A. repens* still survive and whether they had been critically examined at the time of compilation of the *Atlas*.

I reported the above story at the A.G.M. of the Botanical Section of the Y.N.U. on October 4th, 1975. Miss M. M. Hartley checked the Lees herbarium and sent me photocopies of herbarium specimens named as *A. repens* by Lees in his own handwriting. The material was collected on August 2nd, 1875 and the locality is given as 'ponds on Skipwith Common'. Miss Hartley also ascertained that there is no record of identification of the specimen having been checked before the *Atlas* was published or since. Mr. Meikle has confirmed that Lees' Skipwith specimens are true *A. repens*. He is very keen that an effort should be made to re-find this plant and suggests that 'even if the line ponds at Skipwith have gone, it could well be elsewhere in the area'. Pond sides and wet meadows flooded at times are the habitats suggested. The species and/or the hybrid could well be in the Derwent valley and there is also the possibility of either or both taxa being in the Hull valley. Several localities for *A. repens* (as *Sium repens*) were claimed by Baines in *The Flora of Yorkshire* (1840), but Lees in *The Flora of West Yorkshire* (1888) suggested that these records 'probably applied to a procumbent form of *nodiflorum*'.

The Ports Meadow *A. repens* depicted in *A New Illustrated British Flora* (Butcher, R.W., 1961) and in *Drawings of British Plants* (Ross-Craig, S., 1957-59). The species and the hybrid are very similar: both are small procumbent, creeping plants producing roots at the nodes. *A. repens* has 3-6 bracts at the base of the umbel and broad suborbicular fruits which Mr. Meikle states are 'generally produced in abundance', whereas the hybrid has less than three bracts at the base of most umbels and the inferior ovary remains small, urn-shaped and sterile. Provided that conservation requirements can be met it is important that good specimens of both the species and the hybrid are preserved. In the case of the species, mature fruiting specimens are required, and September or even October would seem to be the best time for the search.

The present knowledge of the distribution of *A. repens* and *A. nodiflorum* x *A. repens* in the British Isles suggests that the species was once more widespread, but that as conditions have changed the hybrid has been able to survive in a few localities whilst the species has most often become extinct.

Eva Crackles

Euphrasia salisburgensis Funck in Yorkshire: A Postscipt

In my statement (*Nat.* 87-89: 1975) of the evidence against the claim for the occurrence of the Irish Eyebright in Yorkshire, I advanced eight reasons which all pointed to the conclusion that Lees' specimens purporting to have been collected in Yorkshire were so labelled in error. In the course of this article I stated that I had found no reference to *E. salisburgensis* in any of Lees' notebooks. Recently however I came across an entry in his notebook for the years 1901-1909 which seems relevant to the origin of the BM. specimens. Under the heading "Special Rarer Desiderata — in Herb — Sept. 1, 1908" are listed 115 species, all of them rare to extremely rare British plants. Of these, 33 are deleted with the names or initials of donors following the deletions and in two instances the date of acquisition in 1909 is given. The remaining five species, struck out but without further annotation, include "*Euphrasia salisburgensis* Funck — Hib. 8.". Evidently the implication is that Lees had received specimens of this *Euphrasia* sometime after Sept. 1908 and this would account for the presence of a gathering at the National History Museum, South Kensington, to which his second herbarium went after his death. Presumably an accidental transposition of labels occurred at some time subsequent to his acquiring these specimens.

W. A. Sledge

Colour-ringed Canada Geese at Fairburn

The approachability of Canada Geese, *Branta canadensis*, at Fairburn Ings Nature Reserve and Bird Sanctuary, especially at the lay-by has enabled us to collect a number of records of birds wearing not only the B.T.O. metal ring but an additional colour ring. Through binoculars it is quite easy to read the lettering on the colour rings and we would ask all observers to make a note of such details, not only at Fairburn but anywhere else where colour-ringed Canada Geese may be seen.

Information to hand at present is that a bird with an orange ring DT, began as a gosling at Bretton in 1973, was recaptured there in 1974 and has been seen at Fairburn periodically since mid-August 1975 and up to the time of writing in late March 1976.

Yellow PL and PN are an inseparable "pair" of Allerton Park goslings ringed in 1974. By 12th September 1974 they had moved to Harewood; were seen together on 29th September at Farnham Gravel pits near Knaresborough; and then returned to Harewood where they were seen on various dates from mid-November 1974 to April 1975. They were next "read" at Fairburn on 13th August 1975 and on subsequent dates up to late November. PL was also seen on 29th March, 1976 (see below).

On 20th March 1976, Yellow SC was seen at the lay-by at Fairburn, being much harassed by other Canadas there. It was still present three days later, and also on 29th March when it was in the company of Yellow PL above. Like PL it was ringed as a gosling in Allerton Park in July 1974. Its movements have been well documented. On 31st October it was seen in Hay-a-Park, Knaresborough and at the nearby Farnham Gravel Pits four days later. It was in Harewood Park on five dates between 18th November 1974 and February 1975. Four dates from 11th June to 9th August 1975 suggest that it may well have moulted at Scargill Reservoir. It was seen once at Harewood in late August, in Hay-a-Park on three dates covering most of September, and then again at Harewood on four dates between 24th October 1975 and 14th February 1976. Its behaviour on 20th March suggested that it was a newly arrived bird at Fairburn then, but by 29th it had settled down with the other Canada Geese already present.

Anyone seeing colour-ringed Canada Geese is asked to send details (place, date, colour, letters, together with the name and address of the observer to Dr. C. B. Thomas, Dept. of Chemistry, The University, Heslington, York. I am indebted to Dr. Thomas for the detailed information about the origins and movements of the above colour-ringed Canadas observed at Fairburn.

R. F. Dickens

White-Winged Black Tern at Fairburn Ings

On 25 August 1975 J.W. had been in the Cut Hide at Fairburn Ings Nature Reserve for half an hour when at 1500 hours a tern was seen flying close to the railway embankment at the eastern end of the reserve. The "saddle backed" effect was striking and it differed from immature black terns with which he was familiar. The bird was watched feeding over the water at distances of 50 to 350 yards, and for a few very short periods resting on the edge of the reeds. Feeling sure that this was a white-winged black tern, *Chlidonias leucopterus*, he contacted J.D.P. who arrived at 1800 hours who continued observation for a further half hour.

The salient features of the combined description were that there was a dark patch on the head, dark patches behind the eyes, the nape of the neck and the rump were white, giving the dark brownish grey mantle a box-like appearance. The tail was pale grey, with darker edges to the tips of the tail feathers, the forking of the tail being barely noticeable. The wings were pale grey, lighter over the centre, the trailing edge tending to be darker. The black bill was short, the legs dull red brown and the under parts white.

The tern had a steady flight, arching down suddenly to pick up food in a similar manner to other marsh terns. It was felt that the description was consistent with that of an immature white-winged tern. Amongst other observers were J. Law, C. Varty and R. Martin.

There were three previous records of this species in Yorkshire in the last century, Scalby 1860, Flamborough 1867 and Scarborough 26 September 1896. There were no other records until 1961 when there were two birds at Chelker Reservoir on 13 May 1961; a juvenile at Hornsea Mere 19 August 1961, and adult at Kilnsea 24 July 1964 and at Spurn the same day, singles at Elsecar Reservoir 18 September 1966, Hornsea Mere 1-13 September 1974 and an adult at Wath Ings 19 June 1975.

J. Whitehead
J. D. Pickup

Barred Warbler at Wintersett Reservoir, near Wakefield

Whilst ringing birds at Wintersett Reservoir, near Wakefield on 26th August 1975, a juvenile Barred Warbler *Sylvia nisoria* was caught in a mist net erected in an area much frequented by Whitethroats *S. communis*. J. S. Armitage, D. F. Faulkner, P. Smith and G. J. Speight examined the bird in the hand and full details were submitted to the Y.N.U. Records Committee who accepted the record. On release, the bird flew into dense willow cover and was not seen again.

The weather immediately preceding the date of capture had not been conducive to drift migration from Europe and comparison of the bird's weight with those of newly arrived migrants caught at Spurn Bird Observatory suggested that it may have been in the country for some days. Barred Warblers have been recorded inland in Yorkshire on only two previous occasions: one at Masham on 4th September 1956 and one at Settle from 8th to 10th October 1966. Both birds were caught and ringed. Although a regular migrant along the east coast in autumn, it would appear from the available records that very few penetrate far inland.

J. S. Armitage

Robin's diet — whirligigs?

While clearing out old papers I came across the following note written by my son Jeremy in 1967. It reads:

"On a bright Saturday in October I was working a ditch at Wike, Leeds, for water-beetles when I was attracted by a robin singing in a bush. As I turned to watch him he flew from the bush which overhung the ditch and dived repeatedly at the throngs of whirligig beetles (*Gyrinus natator* L.) on the surface. He could not have been drinking or bathing so I must conclude that he was eating these beetles."

There is no evidence that the robin actually caught a whirligig, and these beetles are so rapid in their movements that it is highly improbable, but the behaviour seems sufficiently unusual to warrant briefly noting.

J. H. Flint

BOOK REVIEWS

Key to British Freshwater Crustacea: Malacostraca by **T. Gledhill, D. W. Sutcliffe and W. D. Williams.** Pp. 72, with 48 figures. Publication No. 32, Freshwater Biological Association. 1976. £1.00.

This publication is a revision of F.B.A. Scientific Publication No. 19 by H. B. N. Hynes, T. T. Macan & W. D. Williams. It is twice the length of the original edition. It provides an up to date means of identifying freshwater Malacostraca and many more of the brackish water/marine-littoral species than the first edition. This is most welcome, particularly with the genus *Gammarus*, as the freshwater biologist not infrequently encounters these species when working in habitats near the coast which are nevertheless above tidal waters. Not only have more species been included but also additional characters for separating difficult species, for example *Gammarus pulex* and *G. lacustris*.

The distribution maps, based on the crude vice-county system, of the first edition have been omitted. This is a sensible decision as one requires finer scale mapping (such as the Biological Records Centre Schemes) to reveal meaningful distribution patterns. In place of the maps an extended bibliography of more than 120 references is provided. This should prove enormously useful to the student wishing to learn more about these fascinating creatures.

This publication effectively removes all excuses for mis-identifications of Malacostraca found in the freshwater habitats of this country.

R.H.L.D.

The Vindolanda Environment by **M. R. D. Seaward.** Pp.31. 55p. **The Animals of Vindolanda** by **G. W. I. Hodgson.** Pp.28. 50p. Barcombe Publications, Haltwhistle. 1976.

These two booklets form part of a series associated with the excavation of the Roman site at Vindolanda, Northumberland. However, they should prove more generally useful to the naturalist interested in the past than their local origin would at first suggest, including as they do much fascinating information on the types of vegetation and species of animal flourishing in northern England 1900 years ago, and the uses — many of them surprising — to which they were put. This sort of information is not readily available without considerable searching through a wide range of learned publications, many of them extremely obscure, and it is most helpful to have the relevant facts collected together and presented in this compact and readily understandable form.

V.A.H.

The Observer's Book of Coarse Fishing by **Peter Wheat.** Pp.191, with 8 colour plates, 18 black and white photographs and numerous line drawings. Frederick Warne. 1976. 90p.

This further addition to the Observer series is intended to turn the frustration and constant failure of the angling beginner into an absorbing and thrill-filled pastime by providing the basic know-how needed from the very start. 16 coarse species are described in accurate detail and illustrated by excellent line drawings. Unfortunately many members of the Carp family hybridize, particularly under unnatural conditions where for instance one species has been introduced to a new locality. Although their identity is best left to the expert no mention of their possible existence in waters that contain closely related species is made in this book. However, the sections that follow are full of advice on the laws of fishing; tackle and baits required; methods to use and how to handle, photograph, weigh and return the fish when caught. Most important of all, the reader is told where the various species are likely to be found.

Books for beginners often disappoint, but this handy pocket book has much to offer anglers of all ages and in particular the young angler.

C.I.M.

Freshwater Fishes of the Sheffield Area by **P. B. Mander, T. H. Riley** and **D. Whiteley.** Pp. 6. Sheffield City Museums Information Sheet no. 14. 1976. 10p. (Obtainable from: City Museum, Weston Park, Sheffield S10 2TP; 18p incl. postage, payable in advance).

This Leaflet provides a summary of the distribution and status of 24 freshwater fishes determined mainly from recent surveys; the information is presented as maps based on 1 km × 1 km grid square recording. General features, food and habitat data are also presented for these, and supplementary information on a further 11 species is given.

The Show Racer (How to show racing pigeons) by **D. McClary**. Pp. 145. Faber and Faber. 1976. £3.95.

This well produced book will appeal to anyone interested in the racing pigeon either as a show bird or strictly as a flyer. It is enthusiastically written and easy to read. The author gives his experiences in the field of showing and there are very useful chapters on loft building, record keeping, selection of breeding pairs, preparation for shows, feeding and judging.

The 13 plates of pigeon portraits are of excellent quality and are chosen to illustrate model types and include several actual show winners. I would recommend the book to any 'racing' man who occasionally benches his birds at the winter club shows. He will learn all the basics of this popular aspect of the sport from this essential reference book. Those who already know about preparing a pigeon for the show pen will no doubt pick up some useful tips and should possess the book for completeness.

J.R.M.

The Classification of European Butterflies by **L. G. Higgins.** Pp.320, with numerous text drawings. Collins, London. 1976. £7.50.

It is six years since Collins published in their "field guide" series, "Butterflies of Britain and Europe" by Higgins and Riley. Judging by the popularity of that guide, the authors must have felt recompensed for their labour. The coloured plates, however, whilst admirable in many respects and virtually flawless in identifying the British species, fell far short of their aim when the whole of the European fauna was considered. Minute subtle differences in aspect in groups such as *Pyrgus, Erebia* and others are difficult to recapture in the coloured drawing.

The present work is complementary to the former book in bringing final aid to identification through anatomical structure. The book opens with a most lucid discussion on various broad aspects of the subject including species, subspecies, clines and a history of classification itself. The various anatomical characters are then described. The main body of the work follows with special emphasis on the genitalia, every species being illustrated with fine meticulous line drawings by the author from originally prepared specimens. It is impossible to praise these too highly; they reflect years of painstaking dedicated minute scrutiny and uncommon ability in penmanship.

In common with other natural orders, many alterations in butterfly nomenclature have taken place in recent years; generic names especially, having changed time and again to the exasperation of the field worker who frequently sees no justification whatever. Various keys in the book at family, sub-family and tribe level tend to minimise and act as a salutary lesson on that outlook. On the other hand, however, the field lepidopterist who knows his larvae is still left with a suspicion that the final criteria in ordering classification are not necessarily to be found in the imago. The two species of *Colias, c. hyale* and *c. australis* (pp.85/86), are seen to have virtually identical genitalia, yet the two larvae are quite distinct. One wonders in dealing with difficult species, whether Mr. Higgins ought to have enlarged on the early stages.

It is a pleasure to handle this book which is flawlessly printed on art paper and finely bound in dark blue cloth. No doubt the price may seem beyond acceptance by some but the general excellence will appeal to the serious worker both here and on the continent.

C.R.H.

A Checklist of the Birds of the World by **Edward S. Gruson**. Pp.212. Collins, London. 1976. £3.95.

This book consists of a complete list of the world's 8,700 bird species and gives the scientific name, the vernacular name, code letters for the major authoritative works of reference and code numbers for the zoogeographical regions in which each species occur. It is no more than that. The list confines itself to the species unit and the order of families and genera follows the monumental 15 volume work by Peters. Genera are listed without a break under their respective family headings and species are listed in alphabetical order within each genera, a system advocated by Moreau, who in 1960 doubted the worth of the generally accepted but arbitrary order within genera. There is a four-page introduction which leads straight into the 180 page checklist which is followed by 12 pages of notes explaining synonyms and other inevitable problems inherent in such a work. There are two pages of source codes which give the major works of reference and a five page bibliography. There is an index of both scientific and English names.

A statement at the start of the introduction that 'This is a book for listers and tickers' is a typically nearctic one and should be ignored. A lot of time, effort and money has been wasted by the American author if this is really the reason for the book. Those who could justifiably make adequate use of it for that purpose alone are too few to warrant the effort of production. There is surely a more worthwhile application; it is a very convenient reference for anyone interested in the world's bird families and the number of species within each. It is for example, very useful to learn at a glance that there are 230 known species of antbirds, 315 hummingbirds, 130 crows and their allies and 17 bowerbirds. To have the scientific names of all the world's birds under one cover is also a great help to those requiring such information but it is a pity that the authorities for such are not given.

By the very nature of its content, the book will have a limited appeal but it is beautifully produced in very modern format and not expensive.

J.R.M.

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Edited by M. R. D. SEAWARD, M.Sc., Ph.D., F.L.S., The University, Bradford

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MILLIPEDES (DIPLOPODA) OF AIREDALE, DEEPDALE, UPPER RIBBLESDALE, WHARFEDALE AND WENSLEYDALE

DOUGLAS T. RICHARDSON

The pages of the *Naturalist* have, over the years, contained scant references to the millipede fauna of Yorkshire. Blower (1952) in his article on British Millipedes summarised the then available data relating to both British and Yorkshire species and provided a comprehensive list of references. In the intervening years a few references to Yorkshire sitings have appeared in the *Naturalist*: Butler (1954); Howes (1973); Richardson (1975); Spalding (1966); Sutton (1969; 1970).

It would appear therefore, from the evidence so far presented, that millipedes have been severely neglected. Fortunately this is no longer true as is evident from the work carried out and the records amassed by the British Myriapod Group since its inauguration in 1970 (Blower 1972).

It is important however that anyone reading this article should realise that the problem of the millipede fauna of Yorkshire and Great Britain has by no means been solved, there are many species whose distribution are inadequately known and an enormous number of 10km × 10km squares for which there are no records whatsoever. There is, therefore, plenty of work yet to be done by both amateur and expert alike.

In addition to the references made in the text, several are listed which should prove of value to the enthusiast; there are: Blower (1970a; 1970b; 1974), Bocock, Heath and Blower (1973), Butler (1956), and Blower and Fairhurst (1968).

My collecting has, so far, been confined to Cononley, Skipton, Carleton, East Marton and Bank Newton areas in the northern tip of vice-county 63; Ilkley, Skipton, Grassington, Bolton Abbey, Blubberhouses, Buckden, Kilnsey, Gisburn and Thornton-in-Lonsdale areas in the western sector of vice-county 64; and Thoralby, Carperby, Askrigg and Deepdale areas in the southern part of vice-county 65. The present study, which was started in 1973, has proved very successful and has resulted in a number of new vice-county records.

The check list of British species of Millipedes (Blower 1958; 1972) lists 48 species: of these 19 can be regarded as rare, occurring in specialised geographical sites and such places as heated greenhouses, and 8 others are limited in their distribution and can be considered as uncommon; of the remaining 21 species, 11 are very common and 10 reasonably common.

To date 15 species are recorded for the whole of vice-county 63, 17 for vice-county 64 and 12 for vice-county 65 (Fairhurst, 1975), not all of which have yet been found in the limited areas covered by this article. It would appear therefore that there is still room for further work. The nomenclature followed is that given in Blower (1958).

GLOMERIDAE

Glomeris (Eurypleuroglomeris) marginata (Villers) The common pill millipede which rolls up into a ball on being disturbed. Normally black in colour but some specimens are brownish-black with yellow markings. Length 7-20mm., breadth 4-8mm. A common species found in a variety of habitats — under stones, logs, amongst grass, hedge bottoms and woodland litter. Found on both calcareous and non-calcareous soils.

(VC 64) Kilnsey, Sleets Gill (34/96), 29/5/73; Grassington, Grass Wood (34/96), 4/6/73, 30/3/75, 21/6/75; Hawkswick, Cote Gill (34/97), 23/9/73; Airton, Scotsthrop Lane (34/85), 26/5/74; Kettlewell, Knipe Scar (34/97), 22/6/74; Buckden Gill (34/97), 6/7/74; Bewerley, Middle Tongue Bank (44/16), 26/8/74; Malham, Lang Scar (34/86), 27/8/74; Malham, Lee Gate (34/96), 27/8/74; Bolton Abbey Woods (44/05), 21/9/74; Goredale Scar (34/96), 27/8/74; Ingleton, Quarry Wood (34/77), 1/6/75; Thornton-in-Lonsdale (34/67), 28/6/75; Kettlewell, Hawfields (34/97), 12/7/75; Kettlewell, Moor End (34/97), 12/7/75; Clapham, Crosshaw Gravel Pit (34/77), 28/8/75; Skipton, Bog Lane (34/95), 21/9/75.

(VC 65 Thoralby, Cross Lanes (44/08), 16/3/75; Askrigg, Woodhall (34/99), 22/6/75.

CRASPEDOSOMIDAE

Polymicrodon polydesmoides (Leach) A handsome light brown slender flat-backed millipede with 30 segments. Very common and unlike most is active throughout the year. Length 17-21 mm., breadth 2-3 mm. Found in woodlands under stones, logs, bark, moss and litter and under stones amongst grass in some limestone gills. Found on both calcareous and non-calcareous soils.

(VC 63) Elslack, Acre Gill Wood (34/94), 28/5/73; East Marton, Netcliffe Hill (34/95), 29/12/74; Barnoldswick, Greenberfield Locks (34/84), 15/3/75; Bank Newton, Langber Plantation (34/95), 19/5/75.

(VC 64) Hawkswick, Cote Gill (34/97), 23/9/73; Bolton Abbey, Lud Stream Brow (44/05), 27/10/73, 21/9/74; Grassington, Grass Wood (34/96), 28/10/73, 30/3/75; Hubberholme, Todd's Wood (34/97), 18/8/74; Bewerley, Middle Tongue Bank (44/16), 26/8/74; Rylestone, Turncroft Plantation (34/95), 22/4/74.

(VC 65) Askrigg, Woodhall (34/99), 22/6/75.

POLYDESMIDAE

Brachydesmus superus Latzel Small almost colourless to light brown, completely blind, flat-backed millipede with 19 segments. Length 8-10 mm., breadth 0.8-1.0 mm. Found under stones, bark, and logs in woodland and grassland (Richardson, 1975a).

(VC 64) Kilnsey, Sleets Gill (34/96), 29/5/73; Grassington, Grass Wood (34/96), 4/6/73.

Polydesmus angustus Latzel The largest and one of the most common of British millipedes. Medium to dark brown in colour with 20 segments and with expanded dorso-lateral keels which give it its characteristic flat-backed appearance. Length 18-25 mm., breadth 3-4 mm. Found in a large number of habitats, both on calcareous and non-calcareous substrata, under stones, logs, moss, leaf litter in woods, fields, hedgesides, etc. Like other members of the family it is completely blind. Erroneously named *Polydesmus complanatus* in older literature.

(VC 63) Carleton, Rushbank Fields (34/94), 23/3/73; Elslack, Clogger Lane (34/94), 28/5/73; Elslack, Acre Gill Wood (34/94), 28/5/73; Carleton, Hesleker Lane (34/95), 23/3/75; Bank Newton, Langber Plantation (34/95), 19/5/75.

(VC 64) Rylstone, Bridle Path (34/95), 17/4/73; Rylstone, Turncroft Plantation (34/95), 17/4/73; Kilnsey, Sleets Gill (34/96), 29/5/73; Hubberholme, Todd's Wood (34/97), 18/8/74; Ilkley Moor (44/14), 6/5/74; Hetton, Boss Moor (34/96); 2/3/75; Kettlewell, Moor End (34/97), 8/3/75, 12/7/75; Kettlewell, Bounty (34/97), 12/7/75; Gisburn, Ellenthorpe (34/84), 15/3/75; Grassington, Grass Wood (34/96), 30/3/75; Blubberhouses, Limekiln Plantation (44/15), 29/6/75; Clapham, Crosshaw Gravel Pit (34/77), 28/8/75.

(VC 65) Carperby, Ballowfield (34/98), 22/6/75; Askrigg, Woodhall (34/99), 22/6/75.

Polydesmus denticulatus C. L. Koch. This species closely resembles *Polydesmus angustus* Latzel (q.v.) and for this reason it is possible that it has, in the past, been confused with the latter. Not a very common species but it turns up occasionally often in association with *Polydesmus angustus*. Habitat similar to *Polydesmus angustus* but it tends to favour base-rich sites. Readily distinguished from *Polydesmus angustus* by the shape of the male gonopods and the female epigyne (Richardson, 1975a).

(VC 64) Kilnsey, Sleets Gill (34/96), 29/5/73; Kettlewell, Hawfields (34/97), 12/7/75; Grassington, Grass Wood (34/96), 4/6/73; Ingleton, quarry Wood (34/77), 1/6/75; Thornton-in-Lonsdale (34/76), 28/6/75.

BLANIULIDAE

Slender cylindrical millipedes often not much more than 1 mm in diameter, and in most cases with more than 30 segments.

Isobates (Isobates) varicornis (C. L. Koch). A light to dark brown animal, length 4-14 mm, breadth 0.3-0.5 mm, distinguished from other members of the family by its triangular

eyespots composed of 20-25 ocelli in each group. A rare species which is found beneath the bark of rotting logs often in association with *Proteroiulus fuscus* and *Cylindroiulus (Aneuloboiulus) punctatus*, (Richardson, 1975c).

(VC 64) Bolton Abbey Woods (44/05), 21/9/74; Kettlewell, Moor End (34/97), 12/7/75; Grassington, Grass Wood (34/96), 28/10/73.

(VC 65 Carperby, Ballowfield (34/98), 22/6/75.

Proteroiulus fuscus (Am Stein). Dark brown with even darker brown repugnatorial glands. Length 7-15 mm., breadth 0.5-0.8 mm., with less than 14 ocelli arranged in a linear group. A very common species which is found in large numbers underneath the bark of rotting logs, tree stumps, etc. Found on both calcareous and non-calcareous soils. Often associated with *Cylindroiulus (Aneuloboiulus) punctatus* (q.v). Collections of *Proteroiulus fuscus* should always be carefully examined for the presence of *Isobates (Isobates) varicornis.* (q.v.).

(VC 63) Barnoldswick, Greenberfield Locks (34/84), 15/3/75.

(VC 64) Grassington, Grass Wood (34/96), 4/6/73; Bolton Abbey Woods (44/05), 21/9/74; Rylstone, Turncroft Plantation (34/95), 22/4/74; West End, Burnt Hill (44/15), 10/6/73; Grunsagill, Cracoe Hill (34/75), 28/3/75; Ingleton, Quarry Wood (34/77), 1/6/75; Kettlewell, Moor End (34/97), 12/7/75; Kettlewell, Bounty (34/97), 12/7/75.

(VC 65) Kidstones, Bank Top Plantation (34/98), 16/3/75; Carperby, Ballowfield (34/98), 22/6/75; Askrigg, Woodhall (34/99), 22/6/75.

Blaniulus guttulatus (Bosc) A very distinctive completely blind whitish to cream coloured animal with bright orange red repugnatorial glands. Coils up on being disturbed. Length 7-18 mm., breadth 0.4-0.7 mm. Has not been found to be very common in the areas investigated.

(VC 65) Thoralby, Cross Lanes (44/08), 16/3/75.

Archiboreoiulus pallidus (Brade-Birks). Completely blind. Very similar in colour to *Blaniulus guttulatus* (q.v.) but the repugnatorial glands are more brownish in colour. Males of the two species readily identified by the shape of the gonopods. Length 10-15 mm., breadth 0.5-0.7 mm. A rare species.

(VC 64) Skipton, Tarn Moor Bridge (34/95), 19/5/73; Grassington Grass Wood (34/96), 21/6/75.

Boreoiulus tenuis (Bigler). Our smallest blaniulid. Cream-white with orange repugnatorial glands. Length 6-11 mm., breadth 0.3-0.4 mm. Under stones, logs, etc.

(VC 63) Carleton, Hesleker Lane (34/95), 23/3/75; Skipton, Carleton Road (34/95), 32/3/75.

IULIDAE

Stouter larger species than the Blaniulidae. All the species described have ocelli.

Tachypodoiulus niger (Leach). One of the commonest species. Brown-black to black with white legs. A very active species found in a large number of habitats, tree trunks, walls, under stones, logs, etc., both on calcareous and non-calcareous soils. Length 19-50mm., breadth 2-3mm.

(VC 63) Elslack, Clogger Lane (34/94), 28/5/73; East Marton, Netcliffe Hill (34/95), 29/12/74; Barnoldswick, Greenberfield Locks (34/84), 15/3/75; Skipton, Carleton Road (34/95), 23/3/75; Carleton, Hesleker Lane (34/95), 23/3/75; Cononley, Gibside (34/94), 5/5/75; Bank Newton, Langber Plantation (34/95), 19/5/75.

(VC 64) Rylestone, Turncroft Plantation (34/95), 17/4/73, 22/4/74; Skipton, Tarn Moor Bridge (34/95), 19/5/73; Ilkley, Stubham Wood (44/14), 20/5/73; Kilnsey, Sleets Gill (34/96), 29/5/73; Giggleswick, Lumb (34/76), 2/6/73; Grassington, Grass Wood (34/96), 4/6/73, 28/10/73, 30/3/75; West End, Burnt Hill (44/15) 10/6/73; Hawkswick, Cote Gill (34/97), 23/9/73; Airton, Scotsthrop Lane (34/85), 26/5/74, 28/8/74; Hubberholme, Todd's Wood (34/97), 18/8/74; Bewerley, Middle Tongue Bank (44/16), 26/8/74; Bolton Abbey Woods (44/05), 21/9/74; Malham, Lee Gate (34/96), 27/8/74; Buckden Gill (34/97), 8/3/75; Bradley, Far Fold (44/04), 28/4/75;

Kettlewell, Hawfields (34/97), 18/5/75, 12/7/75; Ingleton, Quarry Wood (34/77), 1/6/75; Thornton-in-Lonsdale, West View (34/67), 28/6/75; Blubberhouses, Limekiln Plantation (44/15), 28/6/75; Skipton, Bog Lane (34/95), 21/9/75.

(VC 65) Thoralby, Cross Lanes (44/08), 16/3/75; Askrigg, Woodhall (34/99), 22/6/75; Deepdale, Lockin Garth Bridge (34/78), 28/6/75.

Ommatoiulus sabulosus (Latzel). A very handsome species, brownish with two orange-red dorso-median stripes. Found in woodland, hedgebottoms, amongst grass, under stones in fields, etc. Quite common. Length 15-47 mm., breadth 1.6-2.7 mm. Known prior to 1968 as *Schizophyllum (Bothroiulus) sabulosum* (Linné), (Faithurst, pers. comm.).

(VC 64) Grassington, Grass Wood (34/96), 4/6/73; Kettlewell, Knipe Wood (34/97), 22/6/74; Kettlewell, Hawfields (34/97), 18/5/75, 12/7/75; Thornton-in-Lonsdale, Keld Head (34/67), 28/6/75.

Iulus (Micropodoiulus) scandinavius Latzel. An 'oily brown' species very similar in appearance to *Ophyiulus pilosus*. Males of the two species readily distinguished by the shape of the first and second pairs of legs. Length 15-40 mm., breadth 1.4-2.7 mm. Quite common under logs, stones, leaf litter, etc.

(VC 63) Elslack, Acre Gill Wood (34/94), 28/5/73; Bank Newton, Langber Plantation (34/95), 19/5/73.

(VC 64) Grassington, Grass Wood (34/96), 4/6/73; Hawkswick, Cote Gill (34/97), 23/9/73; Bewerley, Middle Tongue Bank (44/16), 26/8/74; Rylstone, Turncroft Plantation (34/95), 22/4/74; Bolton Abbey Woods (44/05), 21/9/74.

(VC 65) Deepdale, Lockin Garth Bridge (34/78), 28/6/75.

Ophyiulus pilosus (Newport). Very similar in appearance to *Iulus (Micropodoiulus) scandinavius* Latzel. (q.v.), but tends to have a more mottled appearance. Males of the two species easily separated by the shape of first pair of legs, which in *Ophyiulus pilosus* are sickle shaped. Length 16-45 mm., breadth 1.0 to 2.5 mm. Relatively common under logs, stones, leaf litter, etc.

(VC 63) Bank Newton, Langber Plantation (34/95), 19/5/75.

(VC 64) Airton, Scotsthrop Lane (34/85) 24/8/74; Kettlewell, Hawfields (34/97), 18/5/75; Grassington, Grass Wood (34/96), 30/3/75; Ingleton, Quarry Wood (34/77), 1/6/75.

Cylindroiulus (Aneuloboiulus) punctatus (Leach). The commonest of all British millipedes readily distinguished by its clubbed caudal process. Occurs in both calcareous and non-calcareous situations under stones, logs, bark and litter. Often found in association with *Proteroiulus fuscus* (Am Stein) (q.v.). Length 13-28 mm., breadth 1.2-2.1 mm. Colour light yellowish-brown.

(VC 63) Elslack, Acre Gill Wood (34/94), 28/5/73; Barnoldswick, Greenberfield Locks (34/84), 15/3/75.

(VC 64) Rylstone, Turncroft Plantation (34/95), 17/4/73; Ilkley, Stubham Wood (44/14), 20/5/73; Kilnsey, Sleets Gill (34/96), 29/5/73; Grassington, Grass Wood (34/96), 4/6/73, 28/10/73, 30/3/75, 21/6/75; West End, Burnt Hill (44/15), 10/6/73; Hawkswick, Cote Gill (34/97), 23/9/73; Kettlewell, Knipe Wood (34/97), 22/6/74; Bolton Abbey Woods (44/05), 21/9/74; Kettlewell, Hawfields (34/97), 18/5/75; Kettlewell, Moor End (34/97), 12/7/75; Kettlewell, Bounty (34/97), 12/7/75; Grunsagill, Cracoe Hill (34/75), 28/3/75; Ingleton, Quarry Wood (34/77), 1/6/75; Thornton-in-Lonsdale, West View and Yordas Wood (34/67), 28/6/75; Bewerley, Skrikes Wood (44/16), 29/6/75; Blubberhouses, Limekiln Plantation (44/15), 29/6/75; Farnley, Farnley Wood (44/16), 28/7/75.

(VC 65) Carperby, Ballowfield (34/98), 22/6/75; Askrigg, Woodhall, (34/99), 22/6/75; Deepdale, Lockin Garth Bridge (34/78), 28/6/75.

Cylindroiulus (Aneuloboiulus) britannicus (Verhoeff). A large stout purplish-brown millipede. Telson not produced and has a rounded posterior extremity. Length 10-16 mm., breadth 0.9-1.4 mm. Found beneath the bark of rotting tree stumps. Microscopical

examination of the gonopods of the male and vulvae of the female is the only positive method of identification.

(VC 63) Barnoldswick, Greenberfield Locks (34/84), 15/3/75.

VICE-COUNTY AND 10 KM SQUARE DISTRIBUTION

	VC			10 KM SQUARE																	
				34 (SD)														44 (SE)			
	63	64	65	67	75	76	77	78	84	85	86	94	95	96	97	98	99	04	05	08	14	15	16
Archiboreoiulus pallidus (Brade–Birks)		●											●	●									
Blaniulus guttulatus (Bosc)			●																	●			
Boreoiulus tenuis (Bigler)	●												●										
Brachydesmus superus Latzel		●												●									
Cylindroiulus (Aneuloboiulus) brittanicus (Verhoeff)	●								●														
Cylindroiulus (Aneuloboiulus) punctatus (Leach)	●	●	●	●	●		●	●	●			●	●	●	●	●	●	●	●		●	●	●
Glomeris (Eurypleuroglomeris) marginata (Villers)		●	●	●			●			●	●		●	●	●		●		●	●			●
Isobates (Isobates) varicornis (C. L. Koch)		●	●											●	●	●			●				
Iulus (Micropodoiulus) scandinavius Latzel	●	●	●					●				●	●	●	●				●				●
Ommatoiulus sabulosus (Latzel)		●		●										●	●								
Ophyiulus pilosus (Newport)	●	●					●			●			●	●	●								
Polydesmus angustus Latzel	●	●	●				●		●			●	●	●	●	●	●				●	●	
Polydesmus denticulatus C. L. Koch		●		●			●							●	●								
Polymicrodon polydesmoides (Leach)	●	●	●						●			●	●	●	●		●		●				●
Proteroiulus fuscus (Am Stein)	●	●	●		●		●		●				●	●	●	●	●		●			●	
Tachypodoiulus niger (Leach)	●	●	●	●		●	●	●	●	●		●	●	●	●		●	●	●	●	●	●	●

New Vice-County Records

VC 63: *Boreoiulus tenuis* (Bigler); *Cylindroiulus (Aneuloboiulus) britannicus* (Verhoeff); *Ophyiulus pilosus* (Newport).

VC 64: *Brachydesmus superus* Latzel; *Isobates (Isobates) varicornis* (C. L. Koch); *Polydesmus denticulatus* C. L. Koch.

VC 65: *Blaniulus guttulatus* (Bosc); *Isobates (Isobates) varicornis* (C. L. Koch); *Polymicrodon polydesmoides* (Leach); *Proteroiulus fuscus* (Am Stein).

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BOOK REVIEW

Vegetables from Small Gardens: A Guide to Intensive Cultivation by **Joy Larcom**. Pp. 234, with line drawings. Faber & Faber. 1976. £3.25

Never since the days of "Dig for Victory" has there been such a revival of interest in growing one's own vegetables, with long waiting lists for allotments in all our cities. Newcomers to gardening bent on transforming their pretty but unproductive lawns and flowerbeds into today's equivalent of a goldmine — a potato patch — have resulted in a spate of books on vegetable growing in recent months, as publishers try to cater to the sudden demand for information. Joy Larcom's book is one of the best of these new books I have come across, and can be very highly recommended. Her information is excellently organized and clearly and concisely presented, and, unusually in a work of this nature, has the additional virtue of being very readable.

The first half of the book contains chapters on soils, fertility, tools and techniques, pests, diseases and weeds. A further chapter on space saving methods is full of ingenious ideas for the small garden owner determined to get the most out of the tiny plot allowed him on a modern housing estate, and deals with the particular problems faced by urban gardeners in a lively and sensible manner.

The second section lists individual vegetables worth growing in the smaller garden alphabetically. Concise but detailed information is provided for each, giving clear instructions on cultivation, harvesting and suitable cooking methods, noting varieties especially suitable for a limited space. An unusual feature is the "space-rating" system devised by the author to evaluate which vegetables will give the best returns in a small garden.

V.A.H.

HELIANTHEMUM CANUM (L.) BAUMG. AT MALHAM

W. A. SLEDGE and G. A. SHAW

The first published record for *Helianthemum canum* (L.) Baumg. in West Yorkshire appeared in Miall and Carrington's *Flora of West Yorkshire* (1862). The locality was given as "Malham, near the Cove". The following year Miall published the first part of an article "On the Botany of Malham."* In this more detailed account of Malham plants the station for the *Helianthemum* is given as "Malham Cove!" and a table is added "made from fresh specimens (August 1859)" in which the stem, leaf and flower characters of *H. canum* are compared with those of the Common Rock-rose. There seems little doubt from these tabulated characters, especially the reference to the exstipulate leaves of one and the stipulate leaves of the other that Miall's *H. canum* had been correctly identified. His discovery was a notable addition to the flora of the West Riding and was all the more creditable since he was only 17 years old in 1859. In one respect his comparison of the two Rock-roses is puzzling for *H. canum* is an early-flowering species, at its best in May and June and normally long past flowering in August. Miall does not appear to have kept specimens of this or any other plants and we have seen no reference to the existence of herbarium specimens of this or any other species gathered by him.

In Lees' *Flora of West Yorkshire* (1888) Miall's record is repeated with the additional remarks that "I believe the record has never been confirmed by any botanist beyond myself. The plant grows on the step-like ledges of rock near the top of the face of the Cove, with a S.W. aspect; but reaching it is somewhat risky for all but the cool headed." The implications of these remarks are that Lees had not only personally verified the accuracy of Miall's discovery but had also been sufficiently cool headed to secure a specimen. There is however no specimen from Malham in his herbarium at Bradford or at London.

It is surprising that Lees should have omitted from his *Flora* any reference to a report which he had published a few years previously (1878). This note appeared in the Botanical Locality Record Club Report for 1877, Dr. Lees being Recorder for the Club and editor of its Reports for five years from the time of its inception in 1873. The entry (p. 233) reads as follows:

> *Helianthemum canum* Dunal. Malham Cove, Mid-west York, in crevices of ledges of scar limestone rock, at about 1,000 to 1,200 ft., almost inaccessible, 1876. Reported in 1862 in Miall and Carrington's Flora (and see *Naturalist*, 1st series vol. 1, p. 212, 1864) for the Cove by the first-named gentleman, who seems to have been the discoverer of it there, for I can find no earlier notice. I doubted it somewhat, until I could verify the species in the station myself, although I had seen a specimen localised from 'the Cove' in the Herbarium of Mr. William Kirkby of Leeds; and I failed to find it in 1869, 1870 and 1871. *F. A. Lees.*

At the end of the first quinquennial volume of the Club Reports there was published (1878) a "Summary of County Distribution additional to 'Topographical Botany'" which constituted a substantial Supplement to H. C. Watson's work which had been printed a few years previously. This Supplement was compiled by Lees and the entry for the species under consideration is: "64 York mid-west. Lees." In the second edition of *Topographical Botany* (1883) credit for the West Yorkshire record for *H. canum* again goes to Lees and not to its rightful discoverer.

*The issue of *The Phytologist* in which this appeared (July 1863) was the last part of this journal to be published and the first part of Miall's article was re-issued with minor changes in wording in *Naturalist* 209-14, Nov. 1864, the subsequent four parts appearing in Dec. 1864, Jan. 1865, April 1865 and Jan. 1866.

It is difficult to reconcile Lees' statement in the *Flora of West Yorkshire*, that the record for *H. canum* at Malham had "never been confirmed by any botanist beyond myself" with his earlier statement that he had seen a Malham specimen of it in the herbarium of William Kirkby of Leeds. In one of Dr. Lees' notebooks there is a long list of species and localities headed "List of West Riding plants with notable localities in the private herbarium of William Kirkby of Hunslet Road, Leeds. Copied from labels themselves in going over Herbarium". *Helianthemum canum* from Malham is amongst the species listed.

In the same notebook there is an entry headed "Skeleton Review of 'The Geology, Natural History and Prehistoric Antiquities of Craven in Yorkshire' by L. C. Miall 1878. Reprinted from the 3rd edition of Whitaker's 'History of Craven'. Leeds: J. Dodgson 1878." In this entry he lists and comments upon a number of notable plants recorded in this work and one of his comments on Miall's Malham list of plants runs: *"Helianthemum canum.* Has this ever been verified by competent observers?" This entry could not have been made before 1878 and is quite incompatible with Lees' claim to have found the plant himself in 1876. The issue of the B.L.R.C. Report for 1877 in which his confirmation of Miall's record was reported was not issued until late in 1878; a list of Corrections and Addenda is dated 15 Sept. 1878 and William West's discovery of *Carex capillaris* at Gordale in June 1878 is recorded in the same issue, so the printed Report could not have appeared before October at the earliest. It would therefore have been possible for Lees to include his record in this issue after seeing Miall's publication earlier in 1878 and subsequently seeing Kirkby's herbarium specimen. If he had in fact found the plant in 1876 one wonders why it was not recorded in the report for 1876 which was issued in the second half of 1877.

Thinking that Kirkby's herbarium might now be in the possession of Leeds City Museum we enquired of Mr. A. Norris who not only confirmed that this was so, but checked that the quoted gathering of the *Helianthemum* was present and very kindly brought the sheet for our inspection. This sheet carries a good specimen of *H. canum*, the label reading: "Malham '76. Coll. Jas. Abbott." Although Lees had correctly transcribed the information from the label to his notebook, his published statement as to the provenance of Kirkby's specimen was incorrect since there is no mention of the Cove on the label. In the manuscript of the *Supplement to the Yorkshire Floras* Lees wrote ". . . almost if not quite gone? — or scarcely successfully arrived? — upon the Cove ledges at Malham where it was in extremely small quantity about 1870, its exstipulate hoary leaves revealing its identity." The date given does not agree with his earlier claim to have found the plant himself in 1876.

James Abbott was a Leeds pharmacist. He was an enthusiastic field botanist and he assembled a considerable herbarium which was bequeathed in 1905 to the Leeds Naturalists' Club in whose keeping it still remains. Unfortunately very many of Abbott's own gatherings lack data as to place and time of collection. There are three sheets of *H. canum* in this collection, one gathered by J. Harbord Lewis at Scout Scar, Kendal in 1872, one from the Great Orme and one labelled in Abbott's handwriting *Helianthemum canum* but without any additional information. This third sheet which carries a single specimen, presumably came from Malham since it is improbable that Abbott would have given Kirkby his only specimen, retaining none himself.

From what we have been able to find out about the history of this species in West Yorkshire, it would seem that there is no reason to doubt the accuracy of Miall's original record. The only herbarium specimen from Malham known to exist is Abbott's specimen in Kirkby's herbarium in the Leeds City Museum though there is reason to believe that an unlocalised and undated specimen in Abbott's collection probably represents part of the same collection made 100 years ago, since when no one has succeeded in refinding the plant. The evidence for Dr. Lees ever having collected the plant at Malham is unconvincing.

SMALL MAMMALS IN THE PEAK DISTRICT

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Introduction

Small mammals have traditionally been studied by trapping and by the accumulation of casual records. The information available from such sources has been summarised for the Sheffield region, which covers most of the Peak District, by Clegg (1963) and Herringshaw (1968); both of them emphasize the limited information on which their accounts are based. The report by Middleton (1970) contained more information on small mammals, but most of it referred to south Derbyshire. The analysis of owl pellets and of the contents of discarded bottles have increased considerably the amount of information available; the present paper is based on about 4,000 records of individual mammals. Delany (1974) has pointed out that little is known of how small mammal distribution in Britain varies with altitude, so that particular attention is paid to this aspect.

Methods

The methods by which small mammals are recorded can be grouped roughly into the four categories, "traps", "owl pellets", "bottles", and "casuals", which are distinguished on the distribution maps (fig. 2-8). **Traps** are the traditional recording techniques; household breakback traps, Longworth live traps and pitfall traps are included in this category. Trapping has the advantage of providing information on specified localities, but the disadvantage of being very time consuming, since the traps take time to set and must then be revisited at regular intervals. In the Peak District, there has been only one extensive trapping programme, carried out in Lathkill Dale by Dr. J. R. Flowerdew and Dr. G. Gardner. Their study has used 90 live traps set for two days prebaiting and then for three days trapping. The study begain in January, 1971, and has continued since then with trapping periods twice a year, in June and December. A limited amount of trapping by ourselves and others has provided only 90 further records of individual mammals from the area. In addition Lowe (1971) carried out some trapping near Marple just west of the Peak District which caught 76 small mammals and about 20 nights trapping at Losehill Hall has caught 59 rodents (Anthony, pers. comm.) (table 1). Trapping has most often been carried out in woodland, so that there is a bias towards woodland rodents; moreover, Drs. Flowerdew and Gardner were concerned primarily with rodent numbers, and did not record individual captures of shrews.

Owl pellets are the regurgitated remains of the meal of the owl, and generally consist predominantly of the fur and bones of small mammals. Some species, notably barn *(Tyto alba)* and long-eared *(Asio otus)* owls, produce large numbers of pellets at a single location, so that a large sample of mammals can be obtained. Other birds of prey also produce pellets, and some kestrel *(Falco tinnunculus)* pellets have been analysed. However, kestrels usually break up the skulls, on which determinations of the mammals are most readily based, and most of the information in table 2 comes from owl pellets. Eleven batches of pellets which yielded 50 or more mammals are listed separately, and the predator species is indicated. A further 40 smaller samples of pellets from various predators and localities are also included. The only large sample already published is that from Upper Hulme (Glue and Hammond 1974); Mawson (1975) has published some additional results from the area.

The obvious disadvantage of this technique is the infrequency with which a large batch of pellets is found. There is also the obvious bias towards the grassland-dwelling field vole, because both barn and long-eared owls tend to hunt over grassland.

Bottles which have been thrown away frequently come to rest sloping neck upwards, and act as pitfall traps (Morris and Harper 1965). This happens most often along roadsides which are banked, and where there is adequate vegetation to provide cover for small

Table 1. The numbers of individual small mammals trapped in the Peak District (ignoring recaptures). On this and subsequent tables, mammal names are abbreviated as *S.a. Sorex araneus*; *S.m. Sorex minutus*; *N.f. Neomys fodiens*; *C.g. Clethrionomys glareolus*; *M.ag. Microtus agrestis*; *A.(s.) Apodemus (sylvaticus)*; *Mus. Mus musculus.*

	S.a.	*S.m.*	*N.f.*	*C.g.*	*M.ag.*	*A.s.*	*Mus.*
Lathkill Dale (Flowerdew & Gardner)	present	present	present	223	26	84	1
Losehill Hall (Anthony)	—	—	—	—	31	28	—
Etherow Country Park (Lowe 1971)	1	—	—	45	20	10	—
Elsewhere (D.W., D.W.Y., *et al.*)	24	4	7	21	8	26	—
Total	25	4	7	289	85	148	1

mammals; lay-byes on main trunk roads are especially productive. Ring-pull cans, frequently used now for drinks, also sometimes act in this way, but milk bottles are by far the most frequent traps. We also have records from two jam jars, a vacuum flask, and an upright potato crisp packet. Some records for the Peak District date back to 1965, but most have been collected in 1974 and 1975. One of us has concentrated on the Sheffield area, the other has covered the Peak more extensively, so that there has been some duplication of coverage in the east.

Casuals include a variety of records, including occasional road casualties, specimens seen or found dead, those caught by cats and other predatory mammals, skeletal remains from fox *(Vulpes vulpes)* droppings, and animals found under sheets of corrugated tin.

Systematic List

Insectivora

Sorex araneus Common Shrew

This is by far the most widely recorded small mammal in the Peak District (fig. 2), largely because it predominates in bottles, forming 60% of their catch. It is also the second most important prey, numerically, of owls in the Peak District, averaging 20% of their catch, but there is considerable variation between samples. Up to 36% of the prey of lowland-hunting owls may be common shrews, but they may form only 2% of the prey of moorland owls. It is also the species most often recorded casually (table 4).

Its altitudinal range is as extensive as any (fig. 9) and we recorded it up to 1,700 feet. Moreover, it is an equally important part of the small mammal fauna above and below 1,000 feet, contributing 54 or 55% to each (table 5). There appears to þe little limitation on its habitat, for we have recorded it in woodland, scrub, hedgerows, grassland, cotton-grass moorland and stony bracken-covered slopes. If there are any habitats in which it is less frequent, these are the moorland ones. Very few records come from the neighbourhood of heather moor, and most of the high altitude records for this species are for grassy roadsides; perhaps like the mole, it follows the roads to high altitudes. In view of the paucity of information from moorland habitats, this will remain speculative until extensive trapping can be undertaken.

Sorex minutus Pigmy Shrew

The pigmy shrew is one of the scarcer elements of the small mammal fauna, contributing only 6-7% of the sample from bottles and from owl pellets. It is nevertheless widely present throughout the Peak District (fig. 4), and likely to occur wherever a large enough sample of

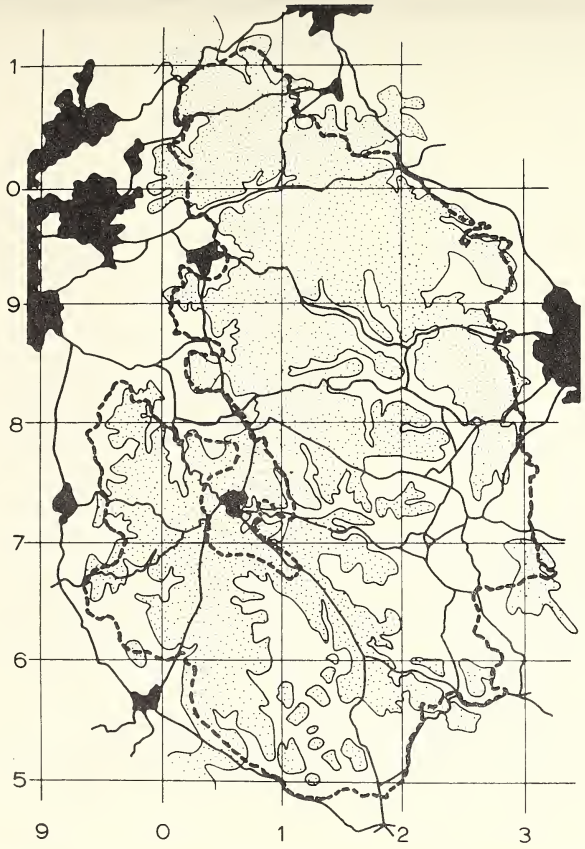


Figure 1. The position of the Peak District National Park (dashed line) in relation to the surrounding towns (black), main roads, land over 1,000 feet (stipple) and the 10km squares of the national grid.

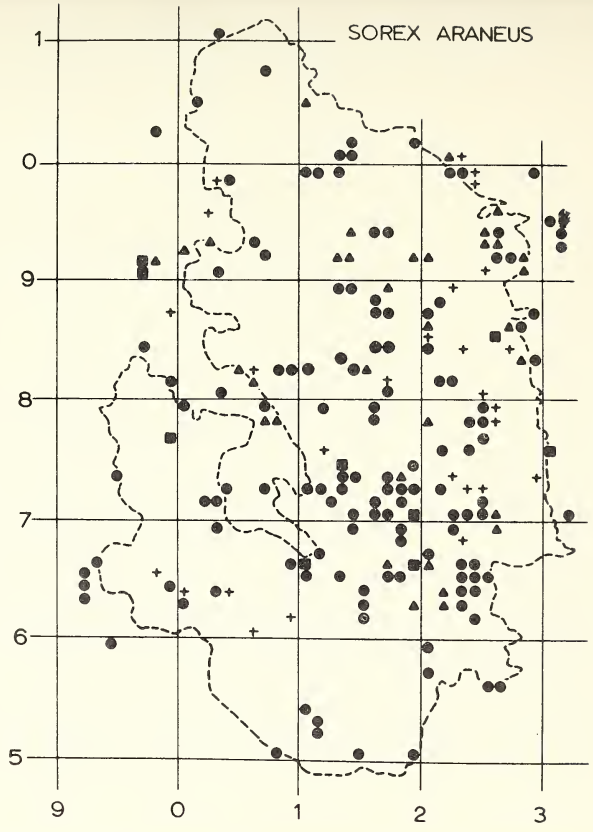


Figure 2. The recorded distribution of the common shrew *Sorex araneus* in the Peak District.

Table 2. The results (percentages) of owl pellet analyses from the Peak District. Samples containing over 50 mammals are detailed. Sample sizes, and percentages, ignore prey of species other than those considered here.

Site	Predator	*S.a.*	*S.m.*	*N.f.*	*C.g.*	*M.ag.*	*A.(s.)*	*Mus.*	Sample Size
Upper Hulme	L.E. Owl	1.9	1.9	0.9	0.5	75.4	19.0	0.5	211
Warslow	L.E. Owl	34.5	1.8	0.0	0.0	61.8	1.8	0.0	55
Tintwistle	L.E. Owl	6.0	38.8	0.0	0.0	35.8	19.4	0.0	67
Ewden	L.E. Owl	2.0	28.0	0.0	4.0	54.0	12.0	0.0	50
Longshaw	Barn Owl	13.1	0.0	0.0	3.3	80.3	3.3	0.0	61
Glossop	Barn Owl	36.5	4.3	0.2	0.0	43.1	15.2	0.7	564
Hassop	Barn Owl	29.0	8.6	2.8	2.1	41.4	15.2	1.0	290
Chatsworth	Barn Owl	19.7	4.8	8.3	8.0	51.9	6.2	1.0	289
Bosley	Barn Owl	17.6	1.2	0.0	2.4	78.8	0.0	0.0	85
Padley	Tawny Owl	7.9	7.9	0.0	7.9	9.5	66.7	0.0	63
Padley	Kestrel	0.0	0.0	0.0	18.8	81.3	0.0	0.0	64
Other	—	11.5	7.6	0.1	3.0	67.8	9.9	0.1	670
Overall %	—	19.4	6.7	1.5	3.0	56.1	12.9	0.5	—
Sample Size	—	480	165	36	73	1385	318	12	2469

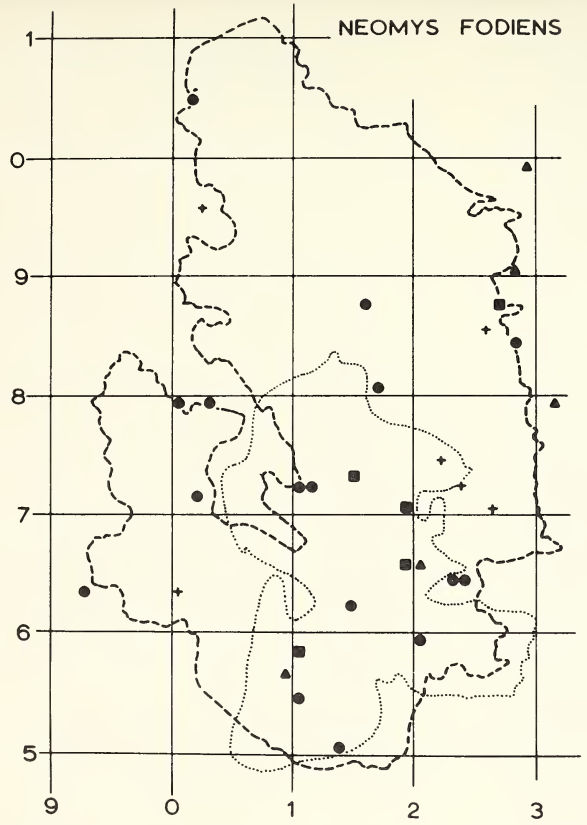


Figure 3. The recorded distribution of the water shrew *Neomys fodiens* in the Peak District. The dotted line indicates the extent of the limestone outcrop.

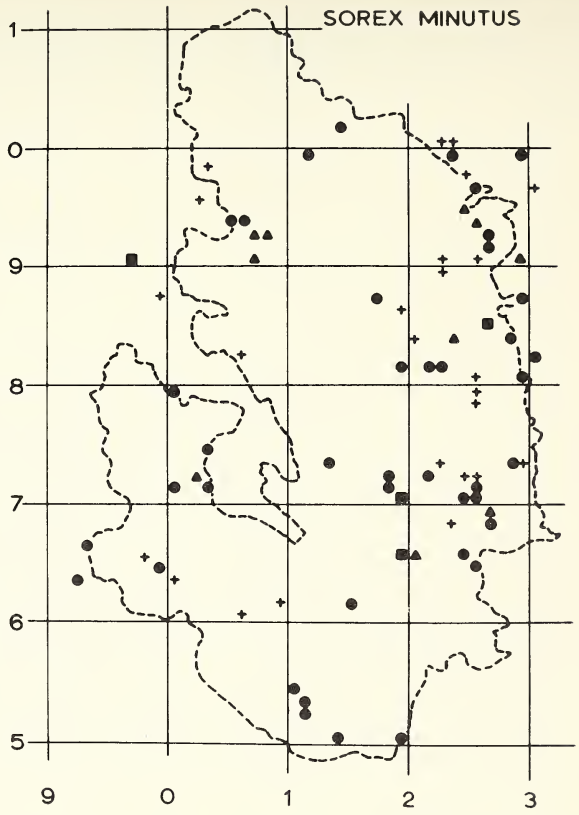


Figure 4. The recorded distribution of the pigmy shrew *Sorex minutus* in the Peak District.

mammals is obtained. It occurs over virtually the same altitudinal range as the common shrew; the highest recorded specimen came from 1,650 feet. However, as is clear from table 5, it tends to be relatively more numerous at higher altitudes than it is lower down, forming 11.6% of the fauna above 1,000 feet but only 6.5% below that height. This suggests a subtle difference in habitat from the common shrew which is not revealed by the distribution map, but which is also suggested by the differences between the various samples of owl pellets (table 2). In most of these, pigmy shrews form fewer than 9% of the prey, but in two of them, from Tintwistle and Ewden, they form 38% and 28%, far outnumbering the common shrews. Both these samples came from long-eared owls living at the edge of heather moorland. This particular owl does not seem to have a specific prediliction for pigmy shrews, since they apparently form only 1.3% of its prey in Britain (Glue and Hammond 1974). One must conclude therefore that these figures represent the abundance of the species in this habitat, especially since there seems to be general agreement that trapping, owl pellet analysis and bottles give similar results for the shrew fauna (Crowcroft 1957, Clegg 1966). Pigmy shrews may be only 4% of the shrews in woodland habitats, 18% in grassland, and 35% on sand dunes (Crowcroft 1957, Clegg 1966, and tables 2, 3.); in these two owl pellets samples they were 86% and 93%, by far the highest recorded.

Neomys fodiens Water Shrew

The water shrew is certainly one of the rarest small mammals in the Peak District, forming less than 2% of the bottle sample and less than 1% of the prey of owls. Nevertheless, there is a wide scatter of records from a wide range of habitats and altitudes (fig. 3). Although not confined to water, it does swim well and is believed to feed largely on aquatic invertebrates, so that it was expected that it would be most frequent in the limestone dales with their faunally rich rivers; indeed, Middleton (1970) recorded it, for the Peak District, only from Millersdale, Lathkilldale, and Dovedale. In fact, the distribution map suggests a fairly even division of the 32 localities between limestone (13) and shale or gritstone (19) areas. At least as surprising was the altitudinal range, with two recorded on Dick Hill at 1,000 feet, one on the High Peak Trail and another on Hallam Moor at 1,100 feet, and one on Goyts Moss at 1,550 feet. Since bottles are rarely found near rivers, and owls have little opportunity for hunting riparian habitats in the Peak District, this species may be under-recorded but it seems more likely, given the habitats available, that it is genuinely rare.

Table 3. The analysis (percentages) of mammal remains from discarded bottles from the Peak District, and from other areas for comparison.

Area	*S.a.*	*S.m.*	*N.f.*	*C.g.*	*M.ag.*	*A.(s.)*	*Mus.*	Sample Size
Peak District	59.8	6.4	1.7	10.7	7.6	13.9	0.0	1029
Surrey (P. A. Morris)	38.9	1.6	1.4	27.1	5.3	25.5	0.2	805
Essex (Corke & Harris 1972)	51.0	3.7	3.1	24.6	2.1	15.1	0.4	1031
N & C Wales (P. A. Morris, D.W.Y.)	39.6	1.5	2.2	28.8	6.5	21.4	0.0	323
Lake District (D.W.Y.)	54.9	4.6	2.0	28.8	0.7	9.2	0.0	153

RODENTIA

Muscardinus avellanarius Dormouse

There have been no recent records of the dormouse from the Peak District, nor any nearby records since the one from Millhouses, Sheffield, reported in 1958 (Clegg 1963). Excavation of cave earth shows that it certainly occurred until the 18th century in the Manifold Valley (Bramwell pers. comm.) and if it still occurs in the Peak District, is most likely to be found in the southern limestone dales. However, even these have relatively little hazel scrub, and much of what remains is heavily grazed or browsed by livestock, making it unsuitable for this species.

Clethrionomys glareolus Bank Vole

In some habitats, as trapping shows, the bank vole is as common in the Peak District as it is anywhere else in the country; in Lathkill Dale it is by far the most frequent catch. However, it is predominantly a species of scrub, woodland edge, and areas with good ground cover, habitats which are not abundant in the Peak District; in particular it is scarce in the north and west (fig. 6). Although it forms 11% of the mammals from bottles, and is the third most frequent species, this is very low by comparison with other parts of the country. Nationally, it is the second most numerous mammal in bottles, and usually forms 25-30% of their catch (table 3). Although its scarcity in the owl pellets, where it was 3% of the prey, is partly a result of the fact that the principal owls hunt open country, even this figure is low. Nationally, bank voles form 4% of barn owl prey and 11% of long-eared owl prey (Glue 1974, Glue and Hammond 1974). The complete absence of bank voles in the large sample of barn owl pellets from Glossop is particularly striking, since this owl was hunting over low ground with hedgerows and waste ground. Even tawny owls, *(Strix aluco)*, which as woodland owls usually feed chiefly on bank voles and woodmice (Southern 1954), caught only 6 bank voles in 146 small mammals in the Peak District.

The general distribution of this vole reflects largely the distribution of available habitat. It is much more numerous in the east and south east, particularly in the limestone areas, where sheep grazing pressure is less and scrub more evident. Its absence in our records above 1,100 feet (fig. 9) reflects the same factors (the single record from 1,200 feet comes from Clegg 1963). In quantitative terms, it contributes only 5% of the small mammal fauna above 1,000 feet, though 14% below that height. One or two records came from the limestone plateau in essentially grassland areas; there the necessary ground cover was probably provided by the dry stone walls.

Microtus agrestis Field Vole

The field vole is essentially a species of tussocky grassland, as it feeds largely on grass, and makes its runways under the cover of grasses. It is widely distributed in the Peak District (fig. 5), but the different methods of recording give more discrepant resulls for this species than for any other. Its considerable abundance in owl pellets, where it forms 56% of the prey, suggests that it is as abundant in the Peak District as it is elsewhere in the country. Though casual records contribute rather few records to this report, this species is more often reported casually than any other rodent; it is diurnal, and quite often seen, while it is also frequently uncovered when sheets of corrugated tin, etc., are turned over. On the other hand, it occurs rather infrequently in bottles nationally, and although perhaps slightly more frequent in them in the Peak than elsewhere, still forms only 8% of the bottle fauna (table 3). This results largely from habitat requirements, since bottles normally lodge in bramble patches etc., where the species is infrequent; even when bottles are found on grassy slopes at roadsides, as at higher altitudes in the Peak District, the grass is too short, being heavily grazed, to support field voles. A possible additional factor, though, is that *Microtus* has a wider head than any other small mammal considered here, and may be less willing, or even unable, to enter bottles. Milk bottles have generally an internal neck diameter about twice the width of a *Microtus* skull, so should be easy to enter, but "pop" bottles may be a close fit; Morris and Harper (1965) demonstrated the relatively lower rodent catch of such bottles.

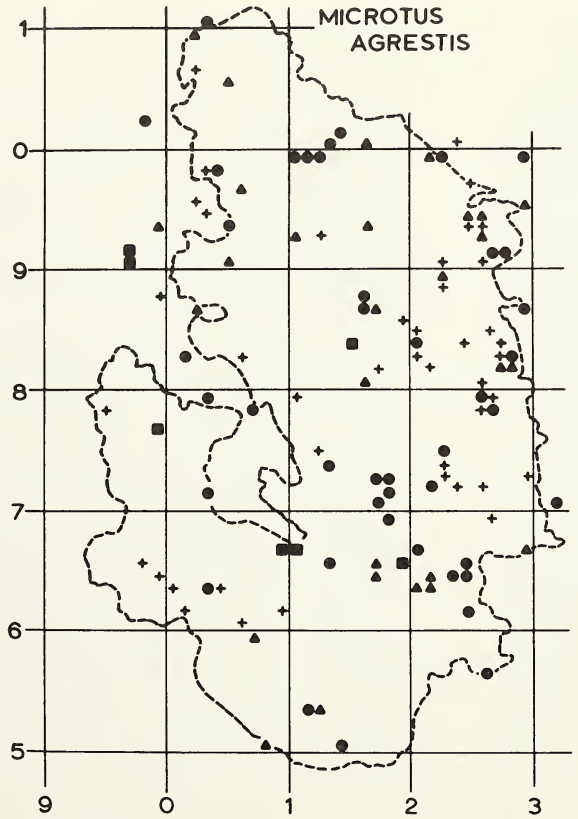


Figure 5. The recorded distribution of the field vole *Microtus agrestis* in the Peak District.

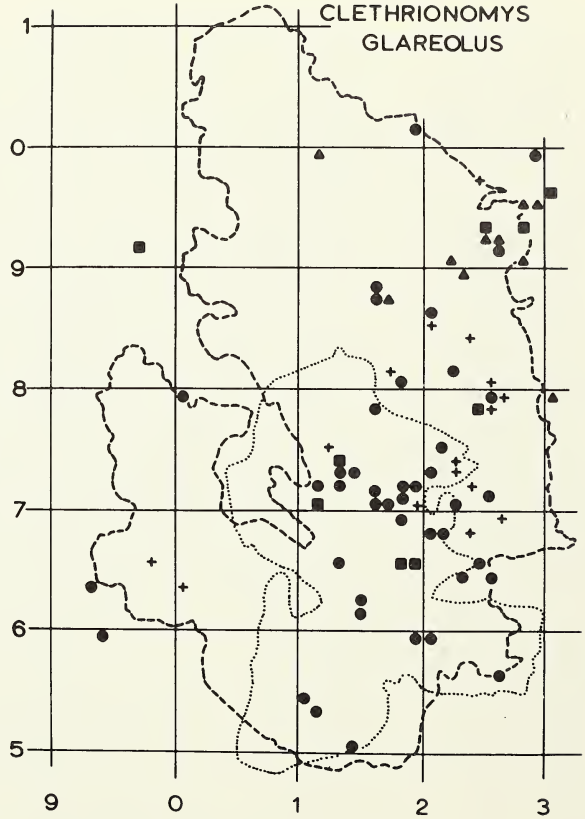


Figure 6. The recorded distribution of the bank vole *Clethrionomys glareolus* in the Peak District. The dotted line indicates the extent of the limestone outcrop. Its relative scarcity in the west is evident.

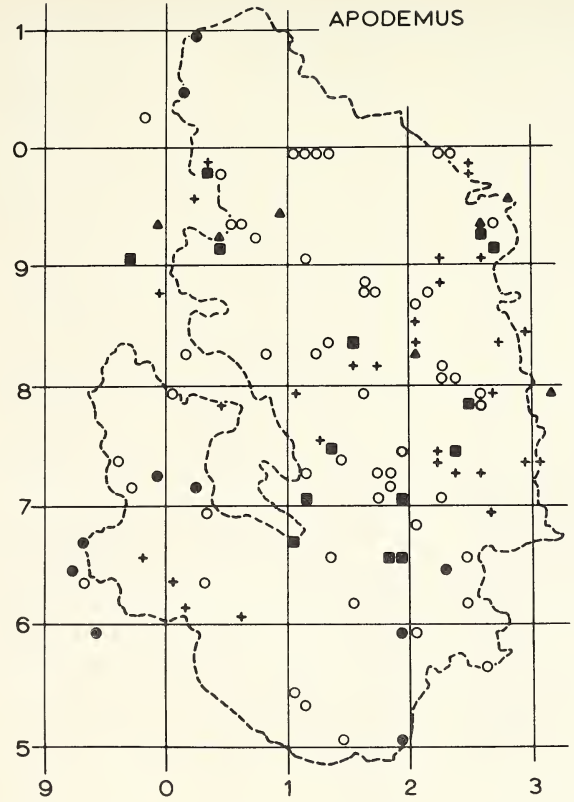


Figure 7. The recorded distribution of the wood mouse *Apodemus* sp. in the Peak District. Solid symbols are records positively identified as *Apodemus sylvaticus*.

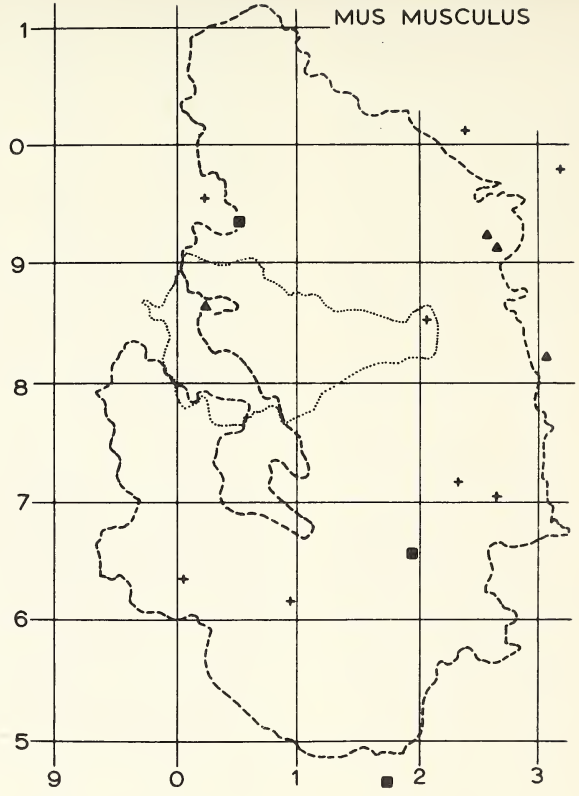


Figure 8. The record distribution of the house mouse *Mus musculus* in the Peak District. The dotted line demarcates the boundary of the Central Area of the Borough of High Peak.

Apodemus flavicollis Yellow-necked Mouse

This species is generally confined to south east England and the counties along the Welsh border, as far north as Suffolk in the east and Shropshire in the west (Corbet 1971). There is, however, one published record for this species in the Peak District, from Longdendale, near Rhodeswood Reservoir, Cheshire, in 1947 (Ellison 1959). No specimen was retained, but it is known that *A. sylvaticus* frequently has a rather large pectoral spot in this area, so that confusion seems possible. Moreover, the habitat of *A. flavicollis* in England seems generally to be mature deciduous woodland, quite unlike the Torside Plantations (Yalden 1971). If this species were to occur in the Peak District, the most likely place to record it would be the deciduous woodlands of the limestone area. Since it has not been found in the extensive trapping undertaken in Lathkill Dale, nor elsewhere, we consider it most unlikely that it actually occurs, and are reluctant to accept the Longdendale record without further evidence.

Apodemus sylvaticus Wood Mouse

The skulls of the two *Apodemus* species can only be distinguished with difficulty, by taking detailed measurements (Fielding 1966). This we have not attempted, so that only the casual records, mice trapped, and a few records from bottles of relatively fresh corpses are positively identified as *A. sylvaticus*. Records from owl pellets, and most of those from bottles, are therefore strictly records of *Apodemus* sp., and are distinguished on fig. 7. As we have indicated, we feel certain that these are in fact records of this species.

The woodmouse is a consistently common member of the small mammal fauna, forming around 13% of both bottle and owl pellet records. Probably because of the bias toward trapping in woodland, it is more numerous in the trapping records, but less frequent in casual records, presumably because it is fairly strictly nocturnal.

It is widely distributed in the Peak District, both geographically and ecologically. Basically it is regarded as a woodland or woodland edge animal, and certainly many records, including most of those from trapping, are from woodland habitats. However, it also ranges widely into areas where some cover is provided by bracken or scree, but which would otherwise be considered as grassland habitats. This is particularly true of roadside banks along the Snake and Woodhead passes, where the species has been recorded up to 1,300 feet. Indeed, it is the second most frequently encountered small mammal above 1,000 feet, forming 16% of the fauna. The highest record we have ourselves obtained is from Axe Edge at 1,600 feet, but we have been told of two seen feeding on picnic crumbs at 1,800 feet on Bleaklow in February, 1976 (M. Marshall pers. comm).

Micromys minutus Harvest Mouse

Though the published maps (Corbet 1971) suggest that the harvest mouse is confined to the south of England, recent field work has shown that it is in fact quite widespread at least as far north as Lancashire and N. Yorkshire (Harris, pers. comm.). However, it is essentially a species of tall grassland, a habitat practically non-existent in the Peak District. The only recent record is of one seen about 3 years ago in a field near Dore, Sheffield (E. Beader pers. comm.). This was a field with cocksfoot *(Dactylis glomerata)* growing in large tussocks, a favoured habitat of this mouse (S. Harris, pers. comm.).

Mus musculus House Mouse

If one had to rely on records obtained during normal field work, one would conclude that *Mus* is the rarest of these mammals in the Peak District (fig. 8), occurring even less frequently than *Neomys*. A single specimen has been trapped in Lathkill Dale, a few have been found in owl pellets, especially those from Glossop, Hassop and Chatsworth, and there are a few casual records. Indeed, it is probably correct to conclude that as a member of the "wild" fauna it is genuinely scarce or absent in the Peak District, but this is not surprising in view of the scarcity of arable farming.

Table 4. Comparison of the results of different techniques for recording small mammals in the Peak District (percentages).

Technique	*S.a.*	*S.m.*	*N.f.*	*C.g.*	*M.ag.*	*A.(s).*	*Mus.*	Sample Size
Traps	4.5	0.7	1.3	51.7	15.2	26.5	0.2	559
Owl Pellets	19.4	6.7	1.5	3.0	56.1	12.9	0.5	2469
Bottles	59.8	6.4	1.7	10.7	7.6	13.9	0.0	1029
Casuals	39.1	10.2	5.5	8.6	25.8	7.8	3.1	128

However, as a commensal of man, it is as common in the Peak as anywhere else in Britain. Mr. Stott, Area Environmental Health Officer for the High Peak Borough Council has kindly supplied some figures for the Central Area of the Borough to support this. During 1975, his office received 132 complaints of mouse infestation (presumably *Mus*, though *Apodemus* could also be involved); this part of the Borough has a population of about 28,000 and covers much of the northern Peak District (fig. 8). In view of the comments above, it may be significant that 118 (89%) of the complaints came from the more urban areas, New Mills, Whaley Bridge and Chapel-en-le-Frith, and only 14 (11%) from the more rural areas of Chinley and Buxworth, Castleton, Hope and Bamford. This could simply mean that people in rural areas are less concerned about mouse infestation, or take direct action themselves rather than lodge an official complaint. However, the disproportion is so great that it seems likely to reflect the general urban nature of the house mouse population.

Discussion

In its general composition, the small mammal fauna of the Peak District is unremarkable; the widely distributed British species occur and in about the same abundance relative to each other as elsewhere, while the three more southern species are either absent or at least very rare.

There are however some differences in the balance of the fauna by comparison with elsewhere which, though they may seem to be points of detail, deserve comment. It is apparent, particularly from the bottle results, that *Sorex araneus* is relatively more numerous than elsewhere, apparently at the expense of *Clethrionomys*. The scarcity of *Clethrionomys* evidently reflects the heavy grazing pressure, especially in the moorland areas where sheep numbers trebled between 1930 and 1968 (Yalden 1972). Scrub is rather rare as a habitat in the Peak District as a result, but it seems possible that the effects of overgrazing are not limited to *Clethrionomys*. *Sorex araneus* and *Apodemus sylvaticus* are apparently more tolerant of rather bare ground, devoid of ground cover, than the other species, and this

Table 5. Percentage composition of the small mammal fauna recorded above and below 1,000 feet. Based on all bottle and casual records, and minor trapping; the three major trapping exercises have been omitted to avoid distortion, and owl pellet information because the altitudes are unknown.

	S.a.	*S.m.*	*N.f.*	*C.g.*	*M.ag.*	*A.(s).*	Sample Size
Above 1,000′	54.2	11.6	1.2	4.8	11.9	16.4	336
Below 1,000′	55.3	6.5	2.7	14.3	8.7	12.5	859
Total	55.0	7.9	2.3	11.6	9.6	13.6	1195

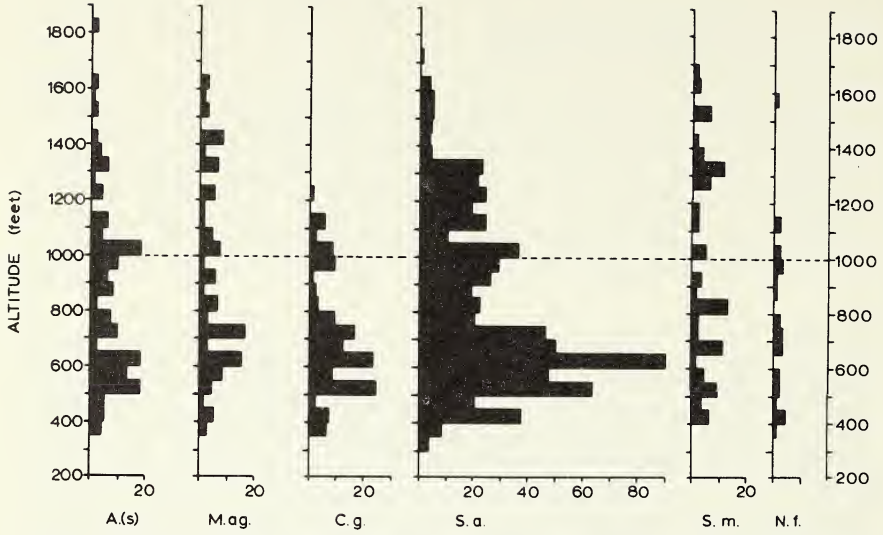


Figure 9. The altitudinal distribution of small mammals in the Peak District. Based on all bottle and casual records, and the minor trapping, but omitting owl pellet records and also, to avoid distortion, the major trapping.

may explain their preponderance along roadsides, which are often tightly grazed. *Microtus agrestis* and *Sorex minutus*, as well as *Clethrionomys*, need ground cover, and it seems likely that they are scarcer in moorland areas than would be expected, especially the heavily grazed moorlands of the western slopes of the Peak District. The Tintwistle long-eared owl evidently had difficulty finding *Microtus*, the usual staple diet of this owl, and the preponderance of *S. minutus* in its diet was remarkable enough. However, more than 50% of its diet, both by weight and numbers, was contributed by birds, especially meadow pipit *(Anthus pratensis)* and twite *(Acanthis flavirostris)*. Though this owl is noted for taking more birds than most other species of British owls, it usually does this in winter; in summer, its diet is generally only 8% birds (Glue and Hammond 1974). This was a breeding site. The point is emphasized by the diet of the neighbouring barn owl, 2 miles away in Glossop, which evidently had no difficulty finding *Microtus* on the low ground.

Though extensive trapping studies may be needed to prove the point, it does seem likely that the small rodents as a whole are rather scarce in the Peak District, especially in western moorland areas. While none of them is endangered as a species, they are themselves the principal prey for many predators, which may rely on them, especially on *Microtus*, as an abundant food source. A common shrew presumably requires as much effort to catch as a field vole, but provides only a third as much food, and a pigmy shrew provides only a quarter as much.

The altitudinal data presented here show clearly that *Clethrionomys* is restricted to lower ground (fig. 9 and table 5) and suggest that *Apodemus*, *Microtus* and *Sorex minutus* are all relatively more common at higher altitudes than on lower ground. This is perhaps the most interesting result of this survey, but it also is the aspect which requires most further work. It is clear that the highest records which we have obtained are not the highest which the species reach; in Scotland, *Apodemus sylvaticus* and *Microtus agrestis* have been recorded from 4,000 feet, *Clethrionomys glareolus* from 2,600 feet, and *Sorex minutus* from 4,400 feet (Southern 1964). Three of these probably occur to 2,000 feet in the Peak District, but our recording methods have failed so far to detect them. Their relative abundance at such altitudes therefore remains even more of a mystery.

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Many naturalists have contributed information or material on which this paper is based. R. A. Frost, J. Hornbuckle, G. P. Mawson, J. B. Pendlebury and J. E. Robson supplied owl pellets or data thereon. Many members of the Derbyshire Naturalists Trust, Sorby Natural History Society and Derbyshire Ornithological Society provided records or material. Dr. A. Deadman (Derbyshire Naturalists Trust), G. Halfpenny (City Museum, Stoke), and T. H. Riley and J. E. Bartlett (Sheffield City Museum) granted access to information in their care. Drs. Flowerdew and Gardner kindly provided details of their work in Lathkill Dale, and S. Anthony provided information on the trapping carried out in the grounds of Losehill Hall. Dr. Morris provided comparative data on mammals in bottles from Surrey and Wales. Mr. Stott helped considerably to overcome our ignorance of *Mus*. We wish to thank all these, and in particular also to thank Miss S. Blagden (D. W.) and Mrs. P. E. Yalden (D. W. Y.) for help with our own field work.

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A PRELIMINARY EXAMINATION OF THE BEETLES OF WHELDRAKE INGS

J. H. FLINT

The Wheldrake Ings Nature Reserve of the Yorkshire Naturalists' Trust is a wetland area of 400 acres on the flood plain of the River Derwent seven miles south-east of York. It is managed as a refuge for wildfowl and management policy is to facilitate flooding and retain large expanses of open flood water during the winter months. Little was known of the insect

population or of the effects on it of the retention of the flood water. A survey has been started to provide information to guide management.

A preliminary sampling of the insect population in grass tufts was made on 7th and 14th February, 1976. Tufts of cocksfoot *(Dactylis glomerata* L.*)* and tufted hair grass *(Deschampsia cespitosa* L.*)* were cut near the base, broken over a sieve and the contents collected, sorted and identified. Most sampling was done just above the upper level of the recent floods where a line of debris had been deposited. Tufts on ground that had been flooded were almost devoid of insect life. Those on well-drained banks just above the upper level of the flood contained enormous numbers of insects, mainly beetles with some bugs and spiders. *Deschampsia* tufts were exceptionally well-populated, especially so along a narrow bank running towards the centre of the reserve where there were phenomenal numbers of ground beetles (Carabidae). The beetles had clearly been washed out by the flood and stranded here and had sought shelter in the tufts. This has some significance for the reserve management policy.

The ground beetles received most attention, interest being excited by the discovery of three species of especial note, all being rare beetles of very wet marshland. These three are *Agonum livens* Gyll., a south-eastern species whose range extends to South Yorkshire (Denaby Ings, where it was first found in 1966, Edderthorpe Ings, Thorne Moors), *Agonum scitulum* Dej., also a southern beetle formerly (1895) taken at Askham Bog and *Pterostichus gracilis* Dej., previously taken a few miles away on Bubwith Ings and in 1850 at Hornsea Mere. Remarkably, eleven species of *Agonum* were taken and almost equally remarkably the three species of flea beetle of the genus *Phyllotreta* that were found in numbers were all species usually regarded as uncommon or rare.

Altogether, 99 species of beetle have been identified so far; a short list of the less common wetland ones is given below. It includes all the ground beetles seen of the *Agonum* and the marsh-haunting rove beetle genus *Stenus*. The list gives an indication of the potential interest of the area to entomologists. My thanks are due to my wife who shared with me the work of sorting and selection, and to Mr. Roy Crossley who joined us and added four species of *Stenus* to our list. Thanks are also due to the Trust for permission to collect.

Species List

Carabus granulatus L.
Bembidion dentellum Thunb.
B. biguttatum F.
B. aeneum Germ.
Pterostichus gracilis Dej.
Agonum moestum Dft.
A. livens Gyll.
A. muelleri Hbst.
A. marginatum L.
A. assimile Pk.
A. obscurum Hbst.
A. dorsale Pont.
A. scitulum Dej.
A. piceum L.
A. thoreyi Dej.
Platystethus nodifrons Sahl.
Stenus clavicornis Scop.
S. juno Pk.
S. rogeri Kraatz
S. bimaculatus Gyll.
S. carbonarius Gyll.
S. boops Ljungh
S. tarsalis Ljungh
S. pallitarsis Steph.
S. argus Grav.
S. pallipes Grav.
S. nigritulus Gyll.
Lathrobium fovulum Steph.
Heterocerus fenestratus Thunb.
Stilbus testaceus Pz.
Anisosticta 19-punctata L.
Phyllotreta tetrastigma Com.
P. flexuosa Illig.
P. exclamationis Thunb.
Psylliodes picina Marsh.

BRYOLOGICAL MEETING AT BOWES (V.C. 65) 13-14 SEPTEMBER 1975

F. E. BRANSON & M. DALBY

We stayed at Barnard Castle for this meeting, it being a very small party, only three members being present. Our Vice-chairman, Mr. G. A. Shaw, was not able to be with us owing to illness and other regular attenders were also incapacitated in other ways. Nevertheless the meeting was very successful and the weather excellent.

On the Saturday we visited Deepdale. This is very well named, being a deep valley with sides strewn with boulders and a stream at the bottom flowing into the River Tees. For the bryologist this place is a veritable paradise, the moss flora being extraordinary prolific, and in the few hours at our disposal it was only possible to take a scanty view of the rich variety spread around us. Still, we were able to gather a good number of specimens; the total number of species examined amounted to 67 mosses and 17 hepatics (84 species in all), not including a number of critical species which I have not yet been able to name. One of the objects of this excursion was to try and refind the rare moss *Philonotis marchica* (Hedw.) Brid., which was found in Deepdale by W. Ingham in 1903. Unfortunately we did not come across it for it was like looking for a needle in a haystack! It is always difficult to locate previous finds, and the best way to bryologise is to take notice of what comes under your immediate ken, and if anything rare turns up, then you are lucky! Now, just a brief mention of some of the species seen and their distribution along the valley. *Dicranum strictum* was unusually prolific, being both on boulders and tree trunks. *Barbilophozia attenuata* was also abundant on boulders, as was *Campylopus flexuosus*; *Isothecium myosuroides* (c.fr.) was plentiful on boulders and tree bases. Near the dismantled railway bridge we descended the steep slope to investigate the stream. On the cliff side was a mass of *Mnium stellare* and on boulders in the stream *Brachythecium plumosum*, *Hygroamblystegium tenax*, *Hygrohypnum luridum*, *Eurhynchium riparioides*, *Fontinalis antipyretica* and *Chiloscyphus polyanthos*. Some of the rarer finds along the valley were *Plagiothecium sylvaticum* on a boulder, *Omalia trichomanoides* on a tree root, *Isopterygium depressum* on a boulder, *Heterocladium heteropterum* on a boulder and *Cephaloziella starkei* on a fallen trunk.

The species seen, but not enumerated above, are included in the following list:

Hepaticae

Conocephalum conicum
Pellia epiphylla
P. endiviifolia
Lunularia cruciata
Ptilidium ciliare
Lepidozia reptans
Calypogeia fissa
Lophozia ventricosa
Barbilophozia floerkei
Plagiochila asplenioides
Lophocolea cuspidata c. per.
Cephalozia bicuspidata
Diplophyllum albicans
Scapania nemorea

Musci

Sphagnum palustre
S. squarrosum
S. plumulosum
Atrichum undulatum
Polytrichum piliferum
P. juniperinum
P. commune
Fissidens bryoides
F. taxifolius
Ceratodon purpureus
Dicranella heteromalla
Dichodontium pellucidum
Dicranoweissia cirrata
Dicranum scoparium
Tortula muralis
Cinclidotus fontinaloides
Barbula unguiculata
B. rigidula
B. cylindrica
Grimmia apocarpa c.fr.
Rhacomitrium aciculare
Tetraphis pellucida
Orthodontium lineare
Pohlia nutans
P. delicatula
Bryum capillare
B. caespiticium
Mnium hornum

M. undulatum
M. punctatum
Neckera complanata
Thamnium alopecurum
Cratoneuron filicinum c.fr.
C. commutatum var *commutatum*
Amblystegium serpens c.fr.
Drepanocladus fluitans
D. uncinatus
Acrocladium cuspidatum
Camptothecium sericeum
Brachythecium rutabulum
B. rivulare
Eurhynchium striatum
E. praelongum
E. confertum
Pleurozium schreberi
Plagiothecium undulatum
Hypnum cupressiforme
H. cupressiforme var *ericetorum*
Rhytidiadelphus squarrosus
Hylocomium splendens

I also examined a wall near Bowes which looked very inviting and gleaned from it three species not included in the Deepdale list. The hepatic *Porella platyphylla* was very abundant and there were also the two mosses *Barbula recurvirostris* c.fr. and *Camptothecium lutescens*. Strangely enough, on this wall (which was by the roadside, very dry and dusty) were growing the two aquatic mosses *Brachythecium plumosum* and *B. rivulare*.

F. E. Branson

On the Sunday we visited Sleightholme Beck at the point where the stream enters a deep limestone gorge. This meant a variety of habitats from open moorland, shaley outcrops and boulders in the stream to the limestone itself.

On the slopes the moorland was typically acid with *Lophozia ventricosa*, *Gymnocolea inflata* and *Campylopus flexuosus*, but a swampy area near the gorge appeared slightly more basic and here *Sphagnum teres*, *Philonotis calcarea* and *Bryum pseudotriquetrum* and *Drepanocladus revolvens* were found. Altogether eight species of sphagna were identified from these habitats. A wet, shaley cliff beside the stream was examined and here *Cratoneuron commutatum*, *Gymnostomum aeruginosum*, *Dicranella varia* and *Polytrichum urnigerum* were growing. Boulders in the stream above the gorge produced *Cinclidotus fontinaloides*, *Rhacomitrium aciculare*, *Hygrohypnum ochraceum* and *Fontinalis antipyretica*, while lower down the gorge *Grimmia alpicola* and *Solenostoma triste* were noted. The limestone gorge revealed the typical calcicole species of *Neckera crispa*, *Scapania aspera*, *Tortella tortuosa* and *Metzgeria pubescens*. Mr. Branson found *Zygodon viridissimus*.

Additional species to those found at Deepdale and those mentioned above are:

Hepaticae	*Marchantia polymorpha*	*Nardia scalaris*
	Riccardia pinguis	*Lophocolea heterophylla*
Musci	*Sphagnum recurvum*	*Pohlia wahlenbergii*
	S. subsecundum var *auriculatum*	*Bryum pallens*
	S. fimbriatum	*B. bicolor*
	S. girgensohnii	*Mnium cuspidatum*
	Polytrichum aloides	*M. longirostre*
	Ditrichum heteromallum	*Aulacomnium palustre*
	D. flexicaule	*Philonotis fontana*
	Dicranella palustris	*Climacium dendroides*
	Encalypta streptocarpa	*Acrocladium stramineum*
	Tortula intermedia	*Isoptergium elegans*
	T. subulata	*Hypnum cupressiforme* var *tectorum*
	Barbula unguiculata	*Rhytidiadelphus triquetrus*
	Rhacomitrium lanuginosum	

Nomenclature for hepatics follows *Census Catalogue of British Hepatics* (4th edition) by J. A. Paton, and for mosses *Census Catalogue of British Mosses* (3rd edition) by E. F. Warburg.

M. Dalby

SPRING FUNGUS FORAY

Pickering, 29 May to 2 June 1975

T. F. HERING

We always expect good collecting when we visit Pickering, for we have the privilege of being guided by Mr. W. G. Bramley through some of his home collecting grounds. This time we were not disappointed. Although the date was unusually late in the season for us, it still managed to just miss the start of a memorable summer, and coincide instead with the last few days of cold and wet. Very cold weather was met on the first day, at Roman Camps and Keldy, while Monday's outing to Dalby was cut short by thunder and hail. A makeshift laboratory at the Black Swan Hotel was a novelty to some members feather-bedded by previous meetings at Universities.

I am grateful to Mr. W. G. Bramley for a very complete list, and to Mr. P. M. Earland-Bennett for a detailed list of lichens, the more interesting of which are given here.

RC = Roman Camps, K = Keldy, G = Gundale, PG = Park Gates, Newtondale, D = Dalby, *new to Yorkshire

DISCOMYCETES (W.G.B., T.F.H.)

Dermea ariae on *Sorbus*, K
Hyaloscypha stevensonii on conifer, K PG
Mitrula paludosa, K
Vibrissea truncorum, K
**Biatorella resinae* on resin, PG
Mollisia fallax, on Larix cone, PG
Apostemidium guernisaci, D
Rutstroemia conformata, on *Alnus* leaves, D
Orbilia sarraziniana, RC
O. xanthostigma on Betula, G
Micropodia pteridina on *Pteridium*, G
Lophodermium hysterioides on *Crataegus* leaves, G

PYRENOMYCETES (W.G.B., C. Booth)

Podosphaera oxyacanthae on *Sorbus* (conidial), K
Cucurbitaria laburni on Laburnum (conidial), PG
Nectria viridescens on conifer, PG
N. episphaeria on *Diatrype stigma*, G
Thaxteria phaeostroma on wood, G

BASIDIOMYCETES (W.G.B.)

Pseudohiatula stephanocystis on pine-cones, K
**Agaricus aestivalis*, G
Psathyrella multipedata, G
Calvatia gigantea, G
Calocera pallidospathulata, RC
Crucibulum vulgare, RC

RUST FUNGI (W.G.B.)

Puccinia sessilis on *Arum*, PG
Melampsora populnea, PG

OTHER FUNGI

Pleurophragmium simplex and *Torula herbarum* on *Heracleum*, G
Synchytrium taraxaci, G
Leptosphaeria culmicola on *Dactylis*, D

LICHENS (P. M. E-B.)

Lecidea scalaris on oak, K
Ochrolechia turneri on oak and birch, K
Toninia caradocensis on birch, K
Opegrapha ochrocheila on wood, K
O. herbarum on wood, K
O. niveoatra on ash, D
Haematomma ochroleucum var. *porphyrium*, K
Xanthoria polycarpa on ash, PG
Lecanora chlarona on ash, PG D
Thelotrema lepadinum on ash, PG
Arthopyrenia salweyi, PG
Cetraria chlorophylla on ash, D
Lecanactis abietina on ash, D

BOOK REVIEWS

Animal Physiology: Adaptation and Environment by **Knut Schmidt-Nielsen**. Pp. 699. Cambridge University Press. 1975. £5.00, paperback

Animal Physiology is a superb book with, as far as I know, no competitors. It is *real* environmental physiology, about real animals and how they solve the problems of living and breeding in the changing environments to which they are subject. Despite the fairly conventional layout of the book, this is not the usual catalogue of isolated physiological processes, but a coherent overview of the action and interaction of the environment with the whole set of processes which make the animal tick. Richly endowed with examples from the field and laboratory, and tied together by the author's obvious love of animals, this book will appeal to all naturalists from sixth form onwards. No stuffy text book this, but at £5.00 a book of outstanding value which can be read and enjoyed by anyone interested in how animals work.

M.J.C.

How We Behave by **G. Carter** and **R. Cox**. Pp. 158, illustrated. Ginn and Co. 1975. £1.95

One of a series on Social Biology for schools, this book introduces concepts of human and animal behaviour for pupils at CSE and 'O' level, and Nuffield Secondary Science courses. Interesting and well written, it covers the basic physiology of sensory inputs, the nervous system, brain and co-ordination, then turns rapidly to social and other forms of behaviour. Some of the colour illustrations are regrettably muddy (and one at least, on p. 60, is wrongly captioned), but the style is right for the 11 — 15 age group at which it is aimed and the presentation — with experiments, puzzles and tests — is pleasantly informal.

B.S.

Intimate Relations by **J. Durrell.** Pp. 160, illustrated. Collins. 1976. £3.50

Jacqueline Durrell, wife of author, traveller and conservationist Gerald Durrell, shares many of her husband's zoological interests. Here she writes engagingly on the animals which have from time to time entered her life, during collecting expeditions and at the Jersey Wildlife Preservation Trust which is her home. Not a profound book, but an entertaining one with fair black and white photographs.

B.S.

For Love of a Wild Thing by **Ernest Dudley**. Pp. 208. Hodder and Stoughton. 1976. 85p

This is the Coronet paper-back edition of a book first published in 1973. It is a light entertaining story of a pair of tame foxes and their relationships with the people and the other creatures with whom they come into contact. Set in the Scottish highlands it tells of their successful breeding and eventual extermination. Not really a book for the natural history shelf, I feel that it was written hurriedly. Careful revision would have avoided such things as, "Suddenly he gave a sudden exclamation"; or Capt Bailey telling us on three occasions that he regarded foxes as he regarded the Germans in the war.

It is inevitable that from time to time some wild creature has to be cared for, but I am averse to popularising it; and I must confess a bias against the rather journalistic way in which the present story is written, with frequent incomplete sentences and not too strict observance of other rules of grammar. The prize effort surely is, "Where was Cassius? All the animal family were making the journey in the Dormobile with Don and his wife Catherine who had handled and petted him for hours when he was a tiny kitten . . .".

R.F.D.

FIELD NOTES

Woodlark at Wintersett Reservoir, near Wakefield

Whilst systematically recording the numbers of species present within the area of Wintersett Ringing Station on 2nd November 1975, J. S. Armitage and G. J. Speight noted a small brownish lark flying over exposed stubble during which time it was possible to compare it with Skylarks *Alauda arvensis* and Tree Sparrows *Passer montanus*. The bird eventually landed on a huge mound of topsoil on a nearby opencast site. Scattered weeds prevented adequate views but it was eventually seen well enough for identification as Woodlark *Lullula arborea* to be made. D. F. Faulkner, P. Smith, R. D. R. Wilkinson and J. Wint were summoned and all agreed to its identity. Shortly afterwards, excellent views were obtained, both in flight and on the ground and the details are given below.

The bird was obviously a small lark with an extremely short tail and frequently gave a very musical three note call. In flight, when compared to Skylark, it appeared more buoyant and undulating with an absence of white outer tail feathers. In exceptionally good light the small black patch with flanking white marks on the leading edge of the wing could be easily seen, even in head-on views. This character was similarly noted when the bird was on the ground. The virtual absence of a crest, the short tail without white outer feathers, the characteristic wing marks and the very prominent pale whitish-buff eyestripes meeting on the nape were the most noticeable features. All the observers considered the call to be most significant, which, phonetically could be described as 'di-do-ee', 'di-do-ee'. Singular points noted were that the legs appeared more pinkish than in Skylark (GJS), the rump appeared more uniformly coloured than in Skylark (JSA), the contrast of the underwing pattern appeared more noticeable when compared with Skylark (JSA), and the underparts were marginally whiter than that species.

Although a search was made on subsequent days by J. S. Armitage, the bird was not seen again. The record has been accepted by the Y.N.U. Records Committee and the sighting is the first for the Wakefield area. It must be pointed out that Woodlarks are not seen in Yorkshire every year, and birds were seen at Spurn Bird Observatory and in the Huddersfield area about the same time suggesting a small influx.

J. S. Armitage
G. J. Speight

Lesser Golden Plover at Bempton, a new bird for Yorkshire

A Lesser Golden Plover, *Pluvialis dominica*, was watched in a cliff-top field near Wandale Farm, Bempton for over 30 minutes from 1500 hrs. on 1st September 1975 and constituted the first record for Yorkshire of this American and Asiatic wader. As this bird is very similar to the closely-allied Golden Plover, *P. apricaria*, the summarised field description is reproduced here in the hope that it may be of value to field ornithologists in the future.

Summary: In company with a single Golden Plover during period of observation. Much smaller and greyer than latter bird with a more pronounced whitish stripe over the eye. In flight, smaller body and more slender wings also evident.

Size and Shape: Very similar to Golden Plover but only about 2/3 to 3/4 size of the latter. Smaller and slimmer body with more of a neck and more tapering rear caused by wing-tips projecting further beyond tip of tail.

Plumage: Overall pattern much as Golden Plover but general appearance was of a much greyer, more ashy, bird lacking the more brown appearance of the larger species. The yellowish markings of the upperside were small spots rather than spangles and whiter, although the spotting on crown and mantle was distinctly yellowish. The underparts were also very ashy including the flanks which appeared lightly barred with dull whitish, becoming whiter on belly and under-tail coverts. The pale stripe over the eye was whiter and more obvious, being highlighted by the almost blackish ground-colour of the crown. The mantle was also very dark. The diagnostic under-wing colour (white in Golden, greyer in

Lesser Golden) was hard to see considering the flight views obtained but glimpses showed the under-wing as not contrasting with the body colour, which it clearly did in the larger bird.

Habits: The bird was first spotted when a Golden Plover I had flushed flew off for a short distance and alighted by a similar but smaller bird, therefore the Lesser Golden Plover had been alone although there was a small party of Golden Plover a few field lengths away. The bird spent most of the observation time, sitting in the grass but stood up as I approached and finally both birds flew off when I was within 25 metres of them. The only call heard was a single, short 'pew' as they rose, being of similar quality to, but possibly more abrupt than, Golden Plover call note.

Comments: I have seen the species previously in South-west England, once in Cornwall in October 1971 and two on the Isles of Scilly in October 1973, I also saw another only three weeks after seeing the Bempton bird, this was also in Cornwall. All of these birds were considered to have been of the American subspecies and were even greyer than the Bempton individual, the size difference with Golden Plover was less marked and they looked longer-legged than the Bempton bird. In view of this I feel that the bird under review was of the Asiatic subspecies.

As mentioned above, the Lesser Golden Plover occurs in two forms, one breeding in Arctic North America and wintering in the South American pampas, *P. d. dominica*, and the other breeding across the Siberian tundra from the Yamal Peninsula east to Alaska, wintering in South-east Asia, Oceania and Australasia, *P. d. fulva*. Both of these subspecies have occurred as vagrants in Western Europe and were popularly known in the older ornithological works as the American and Asiatic Golden Plovers respectively.

My opinion that the Bempton bird was of the Asiatic form is supported by the weather conditions at the time, which brought another Asiatic bird, a Blyth's Reed Warbler, *Acrocephalus dumetorum*, to nearby Filey Brigg on 30th August. These birds were the forerunners of a remarkable autumn of Asiatic bird vagrancy to Western Europe, of which Yorkshire had its fair share. The records of both the Lesser Golden Plover and Blyth's Reed Warbler have been accepted by *British Birds* Rarities Committee.

S. C. Madge

Successful Breeding by Flightless Rook,

There is a small rookery near Menethorpe Hall, North Yorkshire which averages about eighteen nests each year. On 20th February 1976, a Rook *Corvus frugilegus* with a damaged wing and unable to fly was seen in the nearby fields. About two weeks later, general nest building began in the rookery, and two normal rooks started to build a nest in a shrub in the garden about three metres from the ground. It was begun on 27th March and completed on 1st April. A presumed female began to sit immediately and on 4th April was seen to leave the nest and accept food from the damaged bird on the ground. The following day, the disabled rook, presumably a male, took food to the female on the nest by hopping up onto the sloping trunk of the bush and propelling himself upwards through the thick bushy branches. The bark eventually became quite worn and shiny through this behaviour. He was able to glide down to the ground after feeding the sitting bird.

On 12th April, he managed to fly on to the low branch of a nearby tree, but it was not until 20th April that he was seen to fly to the nest with food. The wing was apparently healing and there seemed prospects that he would regain full powers of flight. Inspection of the nest on 23rd April revealed three newly hatched chicks. A further look on 9th May showed only one fully feathered bird which fledged successfully on 22nd May. The male regained full powers of flight on 22nd May.

The interesting facts of these events are the choice of an unusually low nesting site which was presumably connected with the disability of the male; the presence of a third bird, probably an unmated female, which assisted in nest building but not seen subsequently, and the ability of the damaged male to keep in good enough condition to provide food for the female as well as himself for two months whilst in a flightless condition.

Ann Brooksbank

Harvest Mice in the Castleford-Knottingley area in 1975

My interest in the Harvest Mouse, *Micromys minutus* (Pallas), began on Sunday 19th January 1975 at a field meeting in the York area, organised by Stephen Harris who is currently conducting the national Harvest Mouse survey. Two other members of the Castleford and District Naturalists' Society along with myself joined several members from other local natural history societies and Y.N.U. members at this meeting, where we were to learn some of the habits of the mice and more importantly the kind of terrain in which the animal is likely to be found.

Following this meeting two of us found 12 old nests between Knottingley and Kellingley on 21st January, followed by a further 20 nests over the next week or so.

Apart from Mr. A. Pearson finding three nests near Allerton Bywater on 20th May, no further work was undertaken until August when Mr. Pearson found 31 nests in the Castleford-Allerton Bywater area, and the first nest containing young, at Ledston on 12th August.

The importance of these finds and the others listed below will be appreciated by referring to the papers on Harvest Mice in Yorkshire by C. A. Howes (*The Naturalist* 1973, 81-84) and by R. F. Dickens (op. cit., 1975, 13-15). The litter of 12th August would appear to be the first recorded in Yorkshire this century.

A further 17 nests were found in the Fairburn-Ledsham area between 12th and 22nd August, four of them containing young.

Following these discoveries, the sites on the eastern boundary of Knottingley were revisited on 23rd August when 28 nests were found including two which held young. A few days later, B. Heaps and Mrs. S. Gibson watched a parent Harvest Mouse here move six young from one nest to another site.

On 25th August, the Cawood area yielded a nest with young to Mr. Pearson, and by diligent searching he located 11 nests in the Methley-Woodlesford area on 28th-29th August.

We were asked by the survey organiser to record the number of young per litter and their approximate age, being supplied with advice on how to determine the latter.

On a litter count on 31st August, Mr. Pearson and I, accompanied by Mr. and Mrs. Keats, found three nests with young in the Allerton Bywater area. This was before we had mastered the art of removing the young from the nest in order to establish numbers, but two held young which were about eight days old. The third litter was very young, perhaps two days old.

Of 17 nests in the Ledston area on 2nd September, two were breeding nests with young in; and in a concentrated spell of searching from 4th-11th September, Mr. Pearson located 83 nests on a large site near Allerton Bywater, including five with young.

A litter of at least five was found at Knottingley on 4th September, and brief searches revealed a single nest at Monk Fryston on 7th September and two at Cridling Stubbs a week later.

On the latter date, at Knottingley, I discovered one litter of six young which were about nine days old and very active. They left the nest as soon as I touched it but returned when I moved back. Nearby was another nest but the five young in it were dead. They had not been so for long, and had died when about a week old. The following day I found a further dead litter close by. They had died very young and numbered six. The site was adjacent to a cereal field where a dead, damaged adult Harvest Mouse was discovered on 27th August after the crop had been harvested. My wife and I found a further litter at Knottingley on 15th September. There were five young aged about eight days old.

Eight nests were discovered by Messrs. Pearson and Heaps in Methley Park on 21st September. One held seven young aged about eight days. A further four nests were found near Fairburn, and nine between Cutsyke and Featherstone.

As late as 11th October a litter was located near Ledsham but too late in the day to be able to remove the young and see sufficiently well to determine their age.

The two main Knottingley sites yielded 69 nests on 26th October. Among them was one containing another litter of 5 young mice which had been dead a considerable time and had probably died at about a week old. Finding so many nests without a single live litter seemed

as good an indication as any that the breeding season was finished in this area.

On 9th November 49 nests were located at Wintersett. The state of the nests and their exit holes suggested that these had by now been abandoned in favour of winter quarters.

Between 17th and 20th November, A. Pearson found a further 21 abandoned nests within ½ mile of the centre of Castleford.

One can only suppose that the species has been overlooked in the past largely, perhaps, because observers have not thought that the Harvest Mouse was likely to be found in sites other than cereal crops. Observers would naturally be reluctant to search among growing crops, and mechanical means of harvesting have probably reduced the likelihood of finding nests at that time. Whilst modern methods may also have reduced the actual populations in cereals, there is plenty of evidence that the Harvest Mouse thrives at least in some parts of the county, living among rough grassland and reeds.

K. Burden

BOTANICAL REPORTS FOR 1974

FLOWERING-PLANTS AND FERNS

The Recorders wish to thank all tohse who have contributed to this report. Key to initials of contributors: Mrs. P. Abbot (P.A.); E. Chicken (E.Ch.); Miss E. Crackles (E.C.); Mrs. J. E. Duncan (J.E.D.); D. R. Grant (D.R.G.); C. Hartley (C.H.); J. R. Hickson (J.R.H.); F. Houseman (F.H.); C. Howes (C.H.); Miss H. Lefevre (H.L.); Dr. L. Lloyd Evans (L.L.E.); L. Magee (L.M.); T. F. Medd (T.F.M.); C. D. Milne (C.D.M.); F. Murgatroyd (F.M.); J. Oxtoby (J.O.); C. D. Preston (C.D.P.); Miss C. M. Rob (C.M.R.); J. Roberts (J.R.); G. A. Shaw (G.A.S.); Dr. W. A. Sledge (W.A.S.); E. Thompson (E.T.); E. Wear (E.W.); J. A. Wood (J.A.W.); Wharfedale Naturalists' Society (W.N.S.).

Vice-county numbers are given in brackets and the figures indicate 10 km grid squares. †new county record. *new vice-county record.

EAST RIDING (E. Crackles)

A relatively small number of records has been received this year, but many are of great interest; some exceptionally so. The outstanding discovery is of a solitary plant of *Orchis simia* L. found by Mrs. Fritchley. This Yorkshire occurrence is quite remarkable, as the species is now only known to occur in three localities in the south of England and it has never at any time previously been found north of the Thames valley. Another plant new to Yorkshire is *Zostera noltii* Hornem., found by Mr. K. Fenton in pools on the Humber mud flats at Spurn. Up to some twenty years ago, *Zostera* was commonly washed up at Spurn, but only *Z. marina* L. was reported. There are two other new vice-county records: *Potentilla tabernaemontani* Aschers. found in quantity on a south-facing slope on Knapton Wold by Mr. G. Simpson and *Hieracium diaphanum* Fr. found near Sledmere by Mr. Chicken. Also of great interest is the rediscovery of *Pilularia globulifera* L. and *Carex serotina* Mérat on Skipwith Common, thus confirming old records for these species. Another notable record is for *Polygonum rurivagum* Jord. ex Bor. in a barley field at Burythorpe. This is a local species usually of chalk arable in the south of England. The discovery of *Campanula trachelium* L. (Nettle-leaved Bellflower), on the site of ancient woodland near Millington, raises the question as to whether this species is native in the East Riding; old records for the wolds have been assumed to refer to *C. latifolia* L. There is also an additional record for *Platanthera chlorantha* (Custer) Reichb. and for *Salix triandra* L. which are both rare species in the East Riding.

Only species occurring in ten or fewer 10 km squares in VC 61 as recorded in the *Atlas of the British Flora* are included in the following list; a grid-square reference indicating an addition to the distribution of a species:

Pilularia globulifera L. Skipwith Common 44/63; confirming an old record, Wild Flower Society Excursion, comm. T.F.M.

**Potentilla tabernaemontani* Aschers. Knapton Wold 44/87; G. Simpson.
Polygonum rurivagum Jord. ex Bor. (conf. B. T. Styles) Barley field near Burythorpe 44/76; E.Ch.
Salix triandra L. (det. G. A. Nelson) On Humber bank, Skeffling 54/31; E.C.
Campanula trachelium L. Millington Wood 44/85; E.Ch.
**Hieracium diaphanum* Fr. (det. C. E. Andrews) Coombe Wood, near Sledmere 44/96; 1973, E.Ch.
†*Zostera noltii* Hornem. (det. J. E. Dandy) In pools on Humber mud flats, Spurn 54/41; K. Fenton and J. Borman.
Platanthera chlorantha (Custer) Reichb. Wood near Millington 44/85; E.Ch.
†*Orchis simia* Lam. One plant with fine flowering spike: locality withheld; Mrs. A. Fritchley.
Dactylorhiza praetermissa (Druce) Soo x *D. fuchsii* (Druce) Soo? One occurring as a garden weed at Ellerker had empty pollinia and was probably this hybrid 44/92; E.C.
Carex serotina Mérat (det. E.C.) On Skipwith Common 44/63; confirming an old record, Wild Flower Society Excursion, comm. Helen Proctor.
Alopecurus myosuroides Huds. Near Broomfleet 44/82; M. Taylor.

NORTH RIDING (T. F. Medd)

It is encouraging to receive more records than usual and the following are a selection including those not recorded in the *Atlas of the British Flora* from more than ten 10 km squares in the vice-county.
Equisetum fluviatile L. (65) Scruton 44/39; C.D.P.
Thelypteris phegopteris (L.) Slosson (65) Birkdale 35/80; J.A.W.
Gymnocarpium dryopteris (L.) Newn. (65) Birkdale 35/80; J.A.W.
Geranium pyrenaicum Burm.f. (65) Scruton 44/29; C.D.P.
Rhamnus catharticus L. (62) Sleightholmdale 44/68; T.F.M.
Trifolium campestre Schreb. (65) Scruton 44/39; C.D.P.
Hippuris vulgaris L. (65) Scruton 44/29; C.D.P.
Berula erecta (Huds.) Coville (65) Scruton 44/29; C.D.P.
Oenanthe crocata L. (62) 44/47; T.F.M.
Anagallis tenella (l.) L. (62) Sneaton Low Moor 45/90; T.F.M.
Veronica anagallis-aquatica L. (62) Sutton-on-Forest 44/56; T.F.M.
Mentha x *villosa* Huds. nothomorph *alopecuroides* (Hull) Briq. (det. Dr. R. Harley) (62) Cowesby 44/48; C.M.R.
Galeopsis speciosa Mill. (62) Near Upper Silton 44/49; C.M.R.
Senecio squalidus x *vulgaris* (62) Near Wykeham 44/98; E.Ch.
Serratula tinctoria L. (62) Near Helmsley 44/68; C.D.M.
Carex paniculata L. (62) Etton Gill 44/58; T.F.M.
C. spicata Huds. (62) Appleton-le-Moors 44/78; T.F.M.
Hordeum secalinum Schreb. (65) Scruton 44/39; C.D.P.

WEST RIDING (F. Murgatroyd)

Polystichum aculeatum (L.) Roth. (63) On rocks at bottom of Norland Clough; Halifax 44/02 (Recorded here by J. Bolton in 1785)
Polypodium vulgare L. x *P. interjectum* Shivas (64) Colt Park Wood 34/77; J.R.
†*P. vulgare* L. x *australe* Fée (64) Colt Park Wood 34/77; J.R.
P. interjectum Shivas (64) Hurtle Pot, Chapel-le-Dale 34/77; J.R.
Ranunculus sceleratus L. (64) Near Lower Wham 34/76; J.R.H.
R. trichophyllus Chaix (64) Bishop Monkton Ings 44/36; Y.N.U. Excursion
Corydalis claviculata (L.) DC. (64) Birchshow Rocks 34/76; J.R.H.
Draba muralis L. (64) Beckermonds 34/88; W.A.S.
Rorippa islandica (Oeder) Borbás (64) Lower Wham 34/76; J.R.H.
Hypericum androsaemum L. (64) Banks of Nidd, Low Laithe 44/16; L.M.

H. maculatum x *perforatum* = *H. desetangsii* Lamotte (64) Acaster Ings 44/54; T.F.M.
Geranium sylvaticum L. (64) Old railway bank, Ellar Ghyll, near Agars Wood 44/24, F.H.
Rhamnus catharticus L. (64) Bishop Monkton Ings 44/36; Y.N.U. Excursion
Astragalus glycyphyllos L. (64) Between Hazelwood and Hayton Wood, Aberford 44/43; C.H., E.T.
Rubus chamaemorus L. (64) Buckden Pike 34/97; J.R.H.
R. lindleianus Lees (det. A. Newton) (64) Weston Lane, Otley 44/14; F.H.
R. ulmifolius Schott (det. A. Newton) (64) Wetherby railway bank 44/44; Weston Lane, Otley 44/14; F.H.
R. procerus P. J. Muell (det. A. Newton) (64) Weston Lane, Otley 44/14; F.H.
R. sprengelii Weihe (64) Near Warsill, Sawley Estate 44/26; F.H.
Potentilla crantzii (Crantz) G. Beck ex Fritsch (64) Oughtershaw (two stations) 34/88; W.A.S.
Rosa arvensis Huds. (64) Swanside Beck 34/74; J.R.H.
Prunus cerasifera Ehrh. (64) Bridge Hewick (planted?) 44/37; T.F.M.
Epilobium roseum Schreb. (64) Swanside Beck 34/74; J.R.H.
Silaum silaus (L.) Schinz & Thell. (64) Kilnsey 34/96; H.L., and Thorpe Underwood 44/45; F.H.
Salix caprea x *phylicifolia* = *S. bicolor* auct. (64) Salt Lake, Ribblehead 34/77; Lady Anne Brewis per F.H.
Vaccinium x *intermedium* Ruthe (63) Greetland Moor 44/02; F.M. (new station)
Centaurium erythraea Rafn. (63) Rastrick 44/12; J.R.
Myosotis secunda A. Murr. (64) Buckden Pike 34/97; J.R.H.
M. brevifolia C. E. Salmon (64) Barden Moor 44/05; H.L.
Atropa belladonna L. (64) Hazelwood — Aberford area 44/43; Chantry Lane 44/43 & 44/44; Stutton 44/44; C.H., E.T.
Limosella aquatica L. (63) Ingbirchworth Reservoir 44/20; in unnamed reservoir 2½ m. south of Holmfirth 44/10; L.L.E.
Orobanche alba Steph. ex Willd. (64) Settle 34/86; Mrs. Shorrocks (vide *Nat.* 1975, p. 25)
O. reticulata Wallr. (64) Ripon Parks 44/37; Colin Slater per F.H.
Lycopus europaeus L. (64) Westwick Lock 44/36; Y.N.U. Excursion
Campanula glomerata L. (64) Acaster Ings 44/54; T.F.M.
Galium mollugo L. subsp. *erectum* Syme (63) Roadside bank near Boothroyd Reservoir (introduced with grass seed?) 44/01; F.M.
Hieracium dicella Sell & West (det. C. Andrews) (63) Morley railway bank 44/22; D.R.G.
H. strumosum (W. R. Linton) A. Ley (det. C. Andrews) Langcliffe 34/86; D.R.G.
H. vagum Jord. (det. C. Andrews) (63) East Bierley 44/12; Slaithwaite canal reservoir 44/01; Black Brook, Barkisland 44/01; D.R.G.
H. grandidens Dahlst. (det. C. Andrews) (64) Langcliffe 34/86; D.R.G.
H. aurantiacum L. (det. C. Andrews) (63) Hoyland Bank, High Hoyland 44/21; D.R.G.
Crepis biennis L. (64) Acaster Ings 44/54; T.F.M.
Potamogeton polygonifolius Pourr. (64) Buckden Pike 34/96; J.R.H.
P. obtusifolius Mert. & Koch (det. W.A.S.) (64) Farnley Lake 44/24; W.N.S.
P. compressus L. (64) Roecliffe Brickyards 44/36; Y.N.U. Excursion
Zannichellia palustris L. (63) River Calder, near Elland 44/12; Mrs. Younger per F.M.
Epipactis atrorubens (Hoffm.) Schult (64) Field House Wood, Arncliffe 34/97; H.L.
Ophrys apifera Huds. (64) Roecliffe old brickworks 44/36; Y.N.U. Excursion (previously recorded from this square)
O. insectifera L. (64) Hazelwood — Aberford area 44/43; C.H., E.T. (previously recorded from this square)
Typha angustifolia L. (64) Roecliffe Brickyards 44/36; Y.N.U. Excursion
Carex rostrata Stokes (63) Withens Clough Head 34/92; F.M.
Festuca gigantea (L.) Vill. (64) Westwick Lock 44/36; Y.N.U. Excursion
Puccinellia distans (L.) Parl. (63) Cawthorne 44/20; D.R.G.
Poa compressa L. (64) Kildwick 44/04; D.R.G.

ALIENS and CASUALS (Mrs. F. Houseman)

Papaver rhoeas L. var. *hoffmannianum* O.K. (65) Roadside, East Tanfield 44/27; F.H.
P. lateritium C. Koch (63) Waste ground, canal bank, Luddenden Foot 44/02; F.H.
Meconopsis cambrica (L.) Vig. (64) Ellar Ghyll, Otley 44/24; limestone pavement below Ingleborough 44/77; F.H.
Glaucium corniculatum (L.) Curt. (64) Waste ground, Tholthorpe 44/46; F.H.
Descurania sophia (L.) Webb ex Prantl (61) Near Sandholme 44/83; Hull Nat. Hist. Soc. Excursion, comm. E.W.
Diplotaxis muralis (L.) DC. (64) Weed, Lister Street, Ilkley 44/14; J.E.D.
Coronopus didymis (L.) Sm. (63) Abundant in Sowerby Bridge Tip 44/02, F.M.; (64) weed in Ilkley garden 44/14; J.E.D.
Montia perfoliata (Willd.) Howell (63) Woodland, Ryburn Valley, Ripponden 44/02; F.M.
Geranium endressii J. Gay (64) Woodland at Farnley 44/24; R.B. Houseman
Trifolium arvense L. (63) Reseeded area, Shipley station 44/13; G.A.S.
Cotoneaster horizontalis Decne. (65) Old quarry near Wensley station 44/09; F.H.
Tolmiea menziesii (Pursh) Torr. & Gray (63) Still abundant in Cragg Vale, Halifax; now established in Blackburn Valley, near Stainland, Halifax 44/01; F.M.
Epilobium nerterioides Cunn. (64) Near Westwick Lock 44/36;. Y.N.U. Excursion
E. adenocaulon Hausskn. (63) Ripponden, Halifax 44/01, F.M.; (64) Westwick Lock 44/36; Y.N.U. Excursion
Bupleurum subovatum Link. (64) Garden weed of bird seed origin 34/96; H.L.
Heracleum mantegazzianum Somm. & Levier (64) Westwick Lock 44/36; Y.N.U. Excursion
Lycium halimilifolium Mill. (64) Little Ouseburn 44/46; J.O.
Veronica filiformis Sm. (64) Westwick Lock 44/36; Y.N.U. Excursion
Euphorbia lathyrus L. (63) Garden weed, Clarke Hall, Wakefield 44/32; C.H.
Mentha spicata L. (64) Westwick Lock 44/36; Y.N.U. Excursion
Leycesteria formosa Wall. (63) Jean Croft junction, Owston, near Doncaster 44/50; T.F.M.; (64) Acaster Ings 44/54; T.F.M.
Lilium martagon L. (61) Wood near Howsham 44/76; E.Ch.
Hordeum jubatum L. (61) Roadside verge at Shiptonthorpe (Hull to York road) 44/84; E.Ch.
Pharlaris canariensis L. (64) Car park, Barden Bridge 44/05; W.N.S.
Panicum miliaceum L. (64) Car park, Barden Bridge 44/05; W.N.S.
Setaria lutescens (Weigl.) Hubbard (64) Car park, Barden Bridge 44/05; W.N.S.

BRYOLOGY

The Bryological Section met at Hoyland Bank (V.C. 63) for their spring meeting and at Spurn (V.C. 61) for the autumn weekend. These meetings are reported in detail elsewhere; both were well attended and much enjoyed.

Several of the general Y.N.U. field meetings were attended. From the Boroughbridge (V.C. 64) meeting in June Mr. Branson reports *Barbula tophacea*, *B. fallax*, *Dicranella varia*, *Cratoneuron filicinum* and *Drepanocladus aduncus* from the Roecliffe Brickworks; *Tortula latifolia*, *Orthotrichum cupulatum* c.fr., *Cinclidotus fontinaloides*, *Grimmia alpicola*, *Pohlia annotina*, *Dichodontium pellucidum*, *Grimmia apocarpa* c.fr., and *Barbula trifaria* from the weir on the R. Ure opposite Newby Hall; *Plagiothecium ruthei* from woodland near Upper Dunsforth and *Amblystegium kochii* from Monkton Ings.

The July meeting at West Scrafton (V.C. 65) also reported by Mr. Branson produced a number of calcicole species including *Tortella tortuosa* and *Cirriphyllum crassinervium* in the meadows bordering the river, *Cratoneuron commutatum* and *Mnium seligeri* in the marshy areas, and *Cinclodotus fontinaloides* and *Hygrohypnum luridum* on boulders in the river. On the roadside between the bridge and the village *Pohlia cruda* proved the best find of the day.

At the Cotterdale meeting on 14th July twelve species of Sphagna were noted including *S. contortum*, *S. teres* and *S. robustum*.

HEPATICAE (F. E. Branson)

I have not done a great amount of bryologising during the past year and have not been able to trace any new vice-county records amongst the Hepaticae so this list is rather a diminutive one. I look forward to a better year in 1975.

Ricciocarpus natans (V.C. 62) fish pond near Strensall (GR 44/622622) both free floating and growing in the mud at the west side of the pond, E. Chicken.

Riccia fluitans (V.C. 64) on mud at edge of shallow pond, Roecliffe Brickworks, D. Grant & F. E. Branson.

Preissia quadrata (V.C. 65) side of moorland stream at West Scrafton, L. Lloyd Evans.

Chiloscyphus polyanthos (V.C. 64) marsh and bank of R. Nidd, Knaresborough Nature Reserve, W. M. Gow & F. E. Branson.

MUSCI (M. Dalby)

Mr. Branson has continued his work at the Knaresborough Nature Reserve and has added the following species: *Aloina ambigua*, *Rhynchostegiella pumila*, *Fissidens crassipes*, *Mnium marginatum*, *M. cuspidatum*, *Weissia controversa*, *Fissident viridulus* and *Hypnum cupressiforme* var *resupinatum*.

Two new V.C. records for 64 were made during the B.B.S. meeting at Whalley in April, 1973. *Tortula subulata* var *subinermis* from Downholme Bridge and *Bryum bornholmense* from Stocks Reservoir. Another interesting find was *Orthotrichum lyellii* from Sandal Holm which was last recorded in 1907.

Campylopus introflexus was the subject of an article by Mr. E. Thompson in the *Thompsonian*. It has been found in two more stations in V.C. 63 this year, at Hoyland Bank and at Swillington Ings.

Finally may I thank all those who have sent me *Sphagnum* specimens from various places throughout the county and I hope will continue to do so. Many of their habitats are disappearing from drainage schemes and other causes so I would like to record as many as possible.

BOOK REVIEWS

Mammals of Great Britain by **Norman Duerden.** Pp. 32. Jarrold Colour Publications, Norwich. 1975. 30p.

This booklet is an excellent introduction to the British land mammals, with the brief text accurately depicting their habits. The colour photographs illustrate nearly all the species mentioned and do full justice to the attractions of the animals. Most of the native mammals are featured (bats being the exceptions) as well as some introduced species. A bargain for the illustrations alone; and perhaps this book will stimulate a few more people to search out these understudied, secretive, but attractive animals.

M.M.H.

British Moths, Books 3 & 4. Text and photographs by **Geo. E. Hyde**. Jarrold Publications, 1975. 30p each.

In 1974 we reviewed Books 1 & 2 of British Moths in the same series and their excellence prompted us to ask for more. As if by magic, two further books have arrived.

Once again the author has brought together his expert field knowledge with his wonderful flair for insect photography and we really must congratulate him on his varied and restrained choice of subjects. Some of the species included have never before been offered in works of this kind; perhaps among the more striking being the Poplar Grey and Great Oak Beauty with larva in concealment poses.

In his introduction the author's reference even to the apparently minor matter of our vanishing hedgerows and the corresponding possible reduction in our moth population, reflects a complete grasp of every facet of his subject. It is doubtful if publications of such standard and at this price will ever be repeated.

C.R.H.

The Jarrold Countryside Series, **The Countryside in Spring, The Countryside in Summer. The Countryside in Autumn** and **The Countryside in Winter** by **E. A. Ellis.** Pp. 64 each. Jarrold Colour Publications, Norwick. 1975. 60p each.

These four books have the splendid illustrations and accuracy that one has come to expect from Jarrolds, and form an excellent set introducing the countryside in the different seasons. After a few pages of general introduction to the season a small selection of the animals and plants of the various habitats — Hedgerows, Waterways and marshes, Coast, Woodland, and Moors and heaths — are well illustrated, with notes on each species also. With these sections difficult to distinguish and no index, these books lend themselves to browsing or reading through, rather than for any sort of reference.

People who have started to collect the Jarrold Nature Series, Pp. 32 booklets, should note that many of the photographs used here are the same as in the former series, and in some cases almost identical text is given about the species. For instance the fruit and berries illustrations in these four books will nearly all be found in the "Wild Fruits and Berries" booklet. However, for people new to the Jarrold books and with a dawning interest in the countryside generally, these four books will be a good buy.

M.M.H.

Other excellently produced books in this series which have been published in 1976 are: **Insects in Britain**, Books 1 and 2, with text and photographs by **George E. Hyde**, and **Sea Shells of the Seashore** with text and photographs by **Heather Angel**. Each book is fully illustrated in colour, contains 32 pages, and costs 40p.

British Birds of Prey by **Leslie Brown**. Pp. 400, with 16 plates and numerous drawings, maps and graphs. Collins. 1976. £6.00.

The New Naturalist series has acquired a reputation for high quality books on natural history. Few can surpass this volume by Leslie Brown who is an authority on the birds of prey of the world, and here concentrates on those in Britain.

After an introduction on the biology of birds of prey, all the resident British species are considered in great detail. The review of the literature must be the most thorough in existence and the bibliography at the end of the book will provide the serious student with all the source material he could wish for. The striking feature of this section is the enormous deficiency there is in our knowledge of even our common birds of prey. For example there has been no countrywide survey of the breeding biology and population of the kestrel. Surely this would make a most suitable subject for a piece of research in Yorkshire with its well organised ornithological research committee?

A review of the changes in habitat and status enters the realms of conjecture in a most interesting way, tracing the effect of man and climate on the environment and the consequent fluctuations in the status of the birds. Food habits are discussed and again the lack of information in this country is striking. The author makes a plea for all who watch these birds to record as many details of their prey as possible.

There is no doubt that the most important factor in the survival of this group is the effect of man upon them. Game keepers and shepherds continue to persecute them in spite of the lack of evidence that they do much material harm to the game stocks. In no other country does a narrow sectional interest break the law to destroy birds of prey. The final discussion on conservation emphasises these points, also stressing the need for effective legal sanctions against those who destroy these fine birds.

This is a well written account which requires careful study, useful as a bedside book to dip into and equally valuable as reference book to study any aspect of this fascinating subject.

The illustrations are by many of the masters of bird photography and enhance this delightful publication which every ornithologist should possess.

J.D.P.

The Oxford Book of Birds: Pocket Edition. Text by **Bruce Campbell**, illustrations by **Donald Watson**. Pp. 207, many colour plates and drawings. Oxford University Press. 1976. £1.95

This small book is beautifully illustrated: the birds are portrayed in their habitat which gives a real feel of authenticity. Most plates also portray the birds in distant scale which gives a very clear idea of the sort of view an observer can expect. There is the usual page showing 'parts of a bird', and an 'introduction to the main orders and families', together with a useful section giving the main characters and differences. The print throughout is very small which will be difficult for those with less than perfect eyesight but the information given, though brief, is sound and I would recomment the book to anyone taking an interest in the birds of the British countryside. Beginners will find this small pocket edition a most useful aid to naming the birds they see.

J.R.M.

Wildfowl of the Ribble Estuary by **Malcolm Greenhalgh**. Pp. 72, with 3 figures, 49 tables, 32 photographs. Wildfowlers' Association of Great Britain & Ireland, 104 Watergate Street, Chester. 1975. 50p

This is a really good book. It is clearly written, well illustrated, and a bargain.

Although I realise that one cannot draw a hard-and-fast line between ornithologists and wildfowlers, I would say that this is an ornithologist's book rather than a wildfowler's. It is, in fact, basically a regional avifauna — and one that was very much needed. Mr. Greenhalgh has thousands of hours of fieldwork behind him, and has combined that with his academic skill to produce an excellent result.

Dr. W. G. Hale of Liverpool Polytechnic contributes a brief and relevant foreword, and Pamela Harrison's photographs maintain the high standard of the whole product.

K.G.S.

Owned by an Eagle by **Gerald Summers**. Pp. 223. Collins. 1976. £3.95

Writing of a rather dreary view, the author says "none of this did much to encourage the latent poetry in my soul . . ." But certainly the poetry comes out throughout this account of his experience with a tame golden eagle — and a host of other animals and birds. Again, I do not like the idea of taming wild creatures and then publicising the fact; and I am afraid that this book may encourage some less scrupulous and less caring people to try to emulate the author. He is a falconer and the fascinating practices and terminology crop up throughout. The book is well supplied with lively illustrations, the drawings being the work of Eva Hülsmann. The writing is full of imagery and I am sure this will become one of the classics of wildlife writing. A delightful book.

R.F.D.

The World of a Stream by **Heather Angel**. Pp. 128, with 55 photographs and 24 line drawings. Faber & Faber. 1976. £2.95

This book, written primarily for school children, describes the history, geology, farming practices and wildlife of a Hampshire stream. The stream is depicted throughout the four seasons, the author and her husband having undertaken extensive field studies on this particular stream. It is well illustrated with Heather Angel's beautiful black and white photographs and line drawings by Christine Darter; the text, which is concise and to the point, not only tells the reader about the fauna and flora in the unnamed stream, but also shows the changes that take place there from one season to the next. All plants and animals, whether they be mammal, bird, fish, insect or other forms of aquatic life, are given. Heather Angel, who is a marine biologist, gives a list of further reading and information, and also makes various suggestions as to other field projects that children could take part in, such as setting up a stream habitat.

M.J.A.T.

Tortoises and Turtles by **J. L. Cloudsley-Thompson**. Pp. 48, with 32 coloured illustrations by Joyce Bee. The Bodley Head New Biologies. 1976. £1.85.

I enjoyed reading this short book on Tortoises and Turtles, which is one of a series on the general biology and breeding habits of different animals. Well illustrated with coloured drawings, this book is primarily of interest for children, who will be given some information in the management and conservation of chelonians, should they keep them as pets.

M.J.A.T.

Panda written and illustrated by **Cécile Curtis.** Pp. 31 (including title-pages). Frederick Warne. 1976. £1.95.

The panda has an unrivalled attraction for visitors to zoos. This magnetism is due to the animal's charming appearance, mysterious background, rarity and behaviour. This attractive book provides, mainly in the form of delightful line drawings, a portrait of pandas in captivity — in particular Chia-Chia and Ching-Ching, the new arrivals at London Zoo. The text includes information on the panda's discovery, natural habitat, diet, behaviour and conservation. The book is well produced, but the cost (more than 7p per page of text and/or illustration) will deny it the wider audience of young naturalists it richly deserves.

Badgers in Woodlands by **E. Neal.** Pp.16. Forestry Commission Forest Record No. 13. London, H.M.S.O. 1975. 30p.

This pamphlet provides a popular account of the external features, behaviour and distribution of this most interesting mammal. The important role of the badger in woodland ecology and economy, and the provisions of the Badgers Act, 1973, are included in the numerous topics dealt with in a concise and balanced manner.

Red Squirrel by **A. M. Tittensor.** Pp. 36. Forestry Commission Forest Record No. 101. London, H.M.S.O. 1975. 42p.

This booklet provides an excellent account of the squirrel in Britain. Particularly interesting sections deal with the external features, behaviour, ecology and distribution. The latter topic includes cartographic information on the status of this mammal in Britain, which shows its decline in the south and slight increase in the north; the reasons given for these changes may come as a surprise to some natural historians.

Life in the Zoo by **Michael Chinery**. Pp. 96. Collins, 1976. £1.95

A concise account, richly illustrated by Michael Lyster's colour and monochrome photography, of the history and present-day work of the London and Whipsnade Zoos, which emphasises their role in the preservation of rare animals.

The Tropical Forest: Ants, Ants, Animals & Plants by **Mary Batten.** Pp. x + 130 with 51 text figures. Faber and Faber, 1976. £3.60

Mary Batten's lively and informative account of the teeming life of the tropical forest is enhanced by Betty Fraser's delightful line drawings. The book is nice to handle, being excellently produced, and will prove to be a most acceptable addition to the bookshelf of the junior naturalist or the more general reader interested in the tropics.

Concern for the Countryside Charts illustrated by **John Rignall**. Frederick Warne, 1976. 50p each + VAT (70p each + VAT in a plastic tube)

These full-colour wallcharts have been produced in association with the Keep Britain Tidy Group, and illustrate the wildlife of five habitats (hedgerow, motorway, urban, woodland and freshwater) and the major hazards to which the animals and plants are increasingly exposed. The charts will be welcomed by schoolteachers, conservationists, and those responsible for display noticeboards in a variety of institutions.

Strasburger's Textbook of Botany translated by **P. R. Bell** and **D. E. Coombe.** Pp. xviii + 877 with 761 text figures. Longman. 1976. £12.50

This new English edution is a translation of the 30th German edition published in 1971 of this celebrated textbook. The original text has been followed very closely, although the references have been both up-dated and enlarged to include more works published in English. The latter are important if this book is to remain a standard work of reference for sixth formers, college and first-year university students, since a guide to complementary texts, especially those dealing with experimental detail, will be necessary.

The approach is essentially morphological and systematic, and many will find the physiological aspects, although abreast of current developments, are occasionally rather old-fashioned in presentation; furthermore, the section on genetics is limited, and ecology is dealt with very sketchily. Nevertheless, this textbook is still highly recommended for use in advanced botany and biology courses as it contains a substantial quantity of foundation matter in a well-organized manner ably supported by plates, line drawings, and a detailed index.

M.R.D.S.

The Chesea Flower Show by **Hester Marsden-Smedley**. Pp. 153 with 24 pp. of photographs, 4 in colour. Constable, 1976. £3.50

After setting the scene with a very brief description of the origins of the Royal Horticultural Society and the earlier shows it held this book traces the history of the Chelsea Show from the first show in 1913 through to 1975. The style is chatty rather than drily historical and is as much a record of social changes as a description of changes in the items displayed at the show.

T.S.C.

The Oxford Book of Wild Flowers: Pocket Edition by **B. E. Nicholson**, **S. Ary** and **M. Gregory.** Pp. 222, with 96 colour plates and 9 black and white plates. Oxford University Press. 1976. £1.95

Identification by matching the plant with the picture is doubtless the simplest method, for those without any botanical knowledge, of learning the names of wild flowers. The arrangement in this book is accordingly based on flower colour, four to six species being illustrated on each plate with descriptions on the facing page. In all 580 species are illustrated and described and many more related to those depicted are also covered in the text. Most of the illustrations are realistic though occasionally the colour rendering has gone badly astray; *Cirsium arvense* is depicted with blue flowers and three of the Campanulas are shown with flowers of a colour unlikely to be matched even approximately by any wild specimen. Yet this pocket-sized book is likely in most instances to successfully achieve its aim of providing its owner quickly with the correct answer to his problems of identification.

W.A.S.

South-West Wales. A Shell Guide by **Vyvyan Rees**. Pp. 189, with 141 black and white photographs and a map. Faber and Faber. 1976. £3.75

This is a second enlarged and revised edition of the guide first published in 1963 and it deals with the old counties of Carmarthenshire and Pembrokeshire, now united with Cardiganshire into the new administrative region of Dyfed. It is comprehensive and well-researched and it would be difficult to find a natural or man-made feature of any importance in the two counties which the author has failed to mention. The format is of a short introduction to the geography, history and industry of each county, followed by a gazetteer, alphabetically arranged, of places.

The book is essentially one for leisurely reading. with perhaps a visit to this beautiful corner of Britain in mind, or possibly to relive on dark winter evenings the joys of a carefree and relaxed touring holiday in summer days gone by. The photographs, by John, Edward and Sebastian Piper, Peter Burton and Roger Worsley, possess great artistic merit in their own right. They are far from mere adjuncts to the text, and most convey the atmosphere of chapel or castle, surging seas on rock coast or a row of tin-plate workers' houses in Llanelli with elegance, charm and wit.

R.W.O.

A Guide to the British Landscape by **J. R. W. Cheatle**. Pp. 350 + 24 pages of black & white photographs. Collins. 1976. £3.95

The Collins Guides and New Naturalist books are an essential feature of the naturalist's library. This latest work is a compendium of information relating to the British landscape as approached from the viewpoints of the geographer, historian and naturalist. The work covers such topics as geology, soils, trees, grasses, animals (i.e. mammals, lizards and snakes), agriculture (including keys to cattle, sheep, pig and goat breeds), archaeology, architecture and place-name elements.

It must be admitted that this one-volume guide only provides a *pot-pourri* of information readily available elsewhere. However, in whetting the appetite it serves not only as a shop-window for the other excellent Collins publications which cover many of the above components in more detail, but also as a valuable introduction to an interdisciplinary approach to fieldwork. The book is delightfully produced, and the text descriptions are complemented by 66 photographs and more than 570 line drawings. The book will be particularly appreciated by the young fieldworker (13+ years) and the schoolteacher.

M.R.D.S.

American Bird Engravings by **Alexander Wilson.** Pp. 19 + 103 plates, 8 in colour. Dover Publications, New York. 1976. £3.25

Alexander Wilson is known to ornithologists by giving his name to Wilson's phalarope and Wilson's warbler. His birthplace, Paisley, honours him by a statue to the "Father of American Ornithology".

A wandering peddler, he gradually amassed a series of drawings which when engraved became his life work "American Ornithology". This publication reproduces all his plates with those of Charles Bonaparte in the supplement to his work. The standard of printing is excellent and the coloured plates pleasing.

There is an introduction by Dean Amadon and a bibliographical note. Wilson was the forerunner of Audubon and as such changed the representation of birds from the stiff and unnatural poses previously used to a more natural representation. A keen observer, if an indifferent poet, he deserves remembering for his devotion to ornithology. This well produced volume should do this.

J.D.P.

Birds of the Air by **Eric Simms**. Pp. 192, with 33 photographs. Hutchinson. 1976. £4.50

This is an interesting autobiography by a man who has devoted the major part of his life to wildlife recording and broadcasting. Succeeding Dr. Ludwig Koch at the BBC, he developed the new techniques of tape-recording, combining this work with scientific observation in ornithology.

The book gives a factual account of his life and of the very many people of distinction with whom he has worked. In the final chapter he admits that he has been fortunate in background, work, travel and family life and this contentment shines through the book.

The justification of his study of ornithology is worth recording 'Fresh knowledge cannot surely in itself be bad, and I would also add that if we do not care about birds and other animals we may not care how we treat each other. They all evolved long before man in an environment which itself enables man to grow and flourish".

J.D.P.

Trees by **Francesca Greenoak**. Pp. 48. Macdonald Educational, 1976. £1.60

This is the latest title in the *Visual Book* series and as may be expected, the emphasis is upon illustration: pleasing coloured and monochrome photographs and drawings are accompanied by suitable captions and annotations, and a concise text. Junior and middle school pupils will find much of interest, especially in the section on projects.

Doctor Rat by **William Kotzwinkle**. Pp. 244. Aidan Ellis. 1976. £3.95

A fantastic novel in the modern manner, complete with four letter words, obligatory homosexual episode and fashionable prejudices such as the belief that 'chemicals' are bad whereas 'drugs', including cocaine, are good. The author (it *must* be an assumed name) dislikes experiments carried out on animals, scalpels and test-tubes, factory farming, zoos, and the killing of animals for food under any circumstances. He is strong on prejudices but weak on facts — he thinks that dinitrophenol will explode if it is spilt from a bottle, and that a 5% solution of formalin will remove all the soft parts from a rat's body.

The gist of the story is that some laboratory animals rebel, and all the larger wild animals (invertebrates don't count, apparently) become involved. On every continent all the animals assemble in a great meeting for a mystical experience of oneness. Man comes late, and predictably when he does he is armed with all the latest weapons of war and slaughters all the other animals.

The author's sympathy with animals, uninformed by any understanding of them, generates mere sentimental whimsy. 'An absolutely wonderful novel' say the publishers. They must have been reading some other book. But the dust jacket is quite attractive.

F.H.B.

Lichenographia Universalis by **E. Acharius**. Pp. viii + 696 + 14 plates. The Richmond Publishing Co. Ltd. 1976. £36.50

Lichenographia Universalis, published in 1810, was the major work of Erik Acharius (1757-1819) who is justifiably recognised as "the father of lichenology". His pioneer treatment of terminology and taxonomy in this work provided the foundation for the scientific study of lichens. The original work is extremely rare and difficult to obtain, and lichenologists are indebted to Richmond Publishing for making this important work available in facsimile edition (of 175 numbered copies). The text has been clearly reproduced on good quality paper, and the 14 plates (originally hand-coloured and slightly larger in size) are remarkably clear. The work is preceded by an introduction by Orvo Vitikainen which is rather brief but nevertheless includes background information not previously available in English; the reviewer would, however, have preferred to see a more detailed and authoritative introduction for such an outstanding work.

M.R.D.S.

Occurrences of the White-winged Black Tern in Yorkshire — A Correction

Due to a typographical mistake, an error occurred in the above paper in number 937 of *The Naturalist*, page 59.

The records of the species in Yorkshire this century should read as follows:

1961: Two at Chelker Reservoir on 13th May.
A juvenile at Hornsea on 19th August.
1964: One in breeding plumage at Kilnsea on 24th July; no doubt it was the same bird which passed Spurn later the same day.
1966: An immature at Elsecar Reservoir on 18th September.
1969: One at Hornsea Mere on 12th May.
1974: An immature at Hornsea Mere from 1st-13th September.
1975: One at Wath Ings on 19th June.
One at Fairburn Ings on 25th August.

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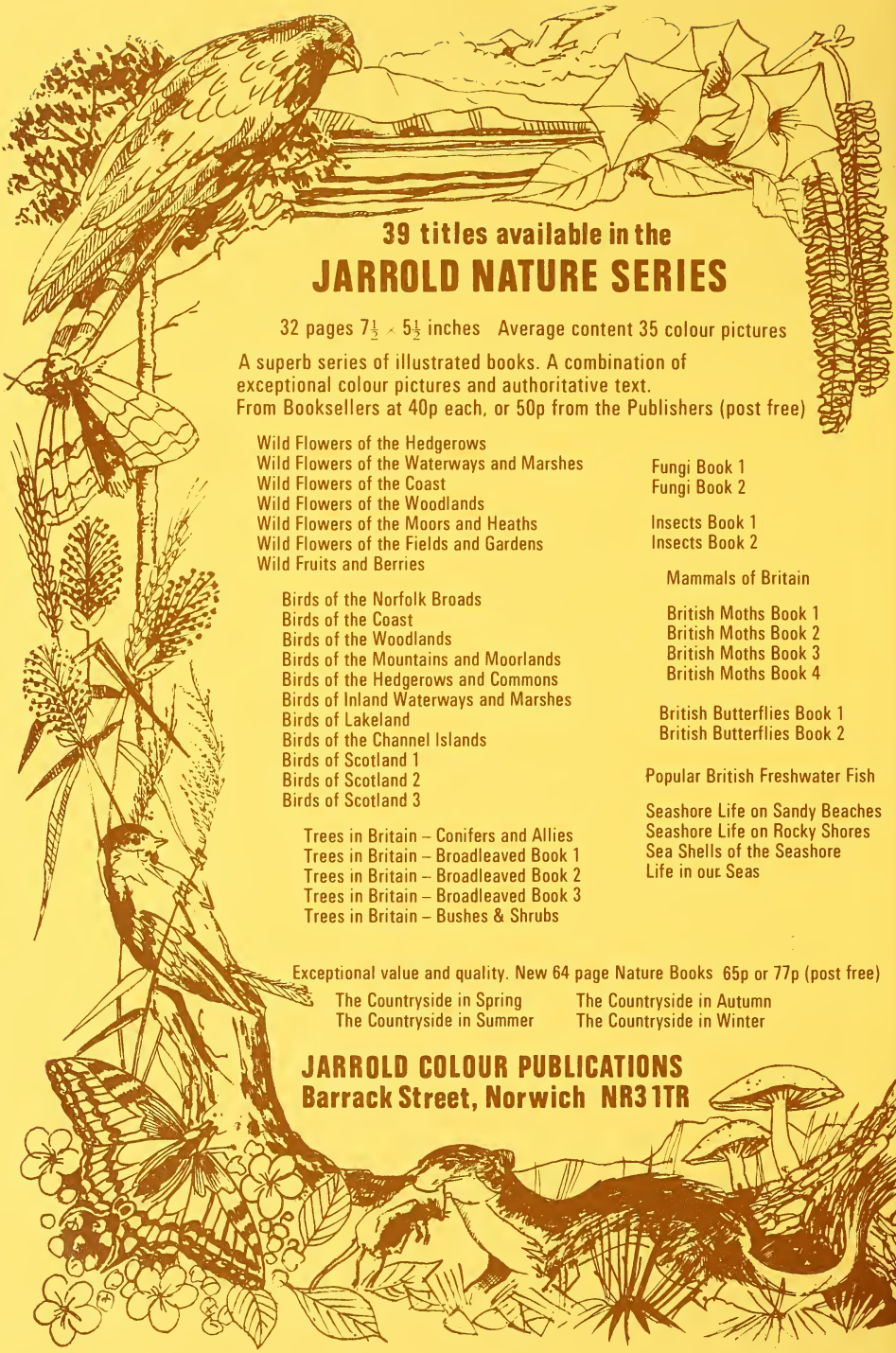
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A DATED LATE DEVENSIAN ORGANIC DEPOSIT AT CAWOOD, NEAR SELBY

R. L. JONES
Lanchester Polytechnic, Coventry

and

G. D. GAUNT
**Institute of Geological Sciences, Leeds*

Description

In June 1973 the extension of a drainage dyke on the north-eastern side of the Cawood to Wistow road, one kilometre south-east of Cawood, exposed a lens of peat within sand shown on the 1:50,000 Geological Survey sheet 71 (Selby) as Sand of the 25-Foot Drift. At the location [SE 5813 3702] where the peat is thickest the stratigraphic succession is:

	Thickness in metres
Silt, brown	0.18
Sand, yellowish brown	0.31
Peat, black, slightly sandy in its upper part	0.15
Clay, blue	0.06
Sand, bluish yellow	—

The bluish yellow sand at the base of the succession possesses fluvial characteristics, having sub-angular to sub-rounded grains in a rather silty and clayey matrix, whereas the yellowish brown sand above the peat, consisting largely of sub-rounded to rounded grains and devoid of an argillaceous content, is suggestive of an aeolian origin. The blue clay and overlying peat are of restricted lateral extent, thinning out in both directions along the dyke and apparently occupying a shallow depression in the underlying sand. The peat is clearly the result of *in situ* growth, with rootlets extending into the underlying clay and bluish yellow sand. The latter is leached where the peat overlaps the clay to rest directly on the sand. A sample from the lowest 20 millimetres of the peat, assayed at the Scottish Research and Reactor Centre, East Kilbride, yielded a date of 10,469 ± 60 radiocarbon years† (SRR-870, IGS C14/187). Two samples of the peat were subjected to pollen analysis and the results are given in Table I. None of the other deposits yielded pollen or spores, and no insect remains were found, even in the peat.

Comments

The sand in the Cawood area is shown by several boreholes to be up to 3.0 metres thick and to rest on between 16 and 24 metres of stoneless laminated clay, indicating that it belongs to the Upper Sand division of the 25-Foot Drift. The Upper Sand is interpreted as consisting mainly of levee deposits of 'proto-rivers' which initiated courses towards the Humber gap following the drainage of Lake Humber and prior to a period of strong aeolian activity and a phase of deep fluvial incision. This sequence of events occurred in late Devensian and early Flandrian times (Gaunt *et al.*, 1971; Gaunt, 1976). The geological map shows that the Upper Sand division forms complex outcrops with NW-SE orientations between Cawood and Selby, relics of the levee deposits of the 'proto-river' Ouse.

The bluish yellow sand at the base of the succession described above is presumably the upper part of the levee deposits; from the height of the ground above the adjacent clay plain at this locality, the thickness of this sand must be of the order of 1.5 metres. The blue clay and peat formed in a shallow hollow or an abandoned channel, perhaps initially in a pond which subsequently degenerated into a small swampy area. To maintain swampy conditions the underlying and adjacent sand must have been water bearing for at least part of the year,

*Published by permission of the Director, Institute of Geological Sciences.

† All radiocarbon dates in this paper are calculated on a ^{14}C half-life of 5570 ± 30 years.

so drainage base-level probably remained close to the level of the surrounding clay plain while the peat was forming. The sand grains in the upper part of the peat must have been blown into the deposit, for there is no evidence of either flooding or solifluction, and the overlying sand certainly suggests aeolian conditions.

The succession in the temporary exposure, therefore, closely reflects the sequence of events deduced from geological mapping elsewhere in the Vale of York, and provides the first absolute date from a stratigraphical level between the levee deposits of the 'proto-river' phase and the blown sand of the aeolian phase. The date is comparable with two others that have a bearing on the start of the aeolian phase in adjacent regions. These are (a) 10,700 ± 190 radiocarbon years from a thin peat in the lower part of blown sand (which rests directly on till) near Sutton on the Forest, north-east of York (Matthews, 1970) and (b) 10,280 ± 120 radiocarbon years from peat beneath blown sand (and resting directly on Lias) at Messingham, northern Lincolnshire (Buckland, 1973). The Messingham date, however, may be on the young side, for another peat at a slightly higher level in the same blown sand has yielded a date (Birm. 707) of 10,550 ± 250 radiocarbon years (Buckland, pers. comm.).

	lower sample (40 mm above base of peat)	upper sample (10 mm below top of peat)
Betula	5	11
Pinus	4	8
Salix	14	23
Juniperus	7	3
Gramineae	2	2
Cyperaceae	62	48
Artemisia	2	< 1
Filipendula	4	2
Rosaceae (undifferentiated)	< 1	< 1
Rumex acetosa	< 1	< 1
Umbelliferae	< 1	—
Lycopodium selago	< 1	< 1
Total number of pollen and spores counted:	112	132

Table 1. Pollen analyses of peat from Cawood.
(Values expressed as percentages of total pollen and spores)

There was apparently no marked variation in local vegetation during the formation of the peat and it is clear that no biozonation of the deposit would be possible even with more closely spaced sampling. Matthews (1970) has quoted a superficially similar pollen analysis from an organic layer near Sutton on the Forest which occurred 0.15 m above the base of blown sand and 1.16 m below a humose clay dated at 9,950 ± 180 radiocarbon years. The similarity, however, is largely due to the predominance of Cyperaceae pollen in both deposits, much of it probably derived from localized swamp vegetation. The only detailed palynological study of late Devensian and Flandrian organic deposits in the area adjacent to Cawood is that by Bartley (1962) from a site on the Escrick Moraine near Tadcaster. Because of the paucity of non-Cyperaceae pollen and restricted taxal range from Cawood, it would be unwise to suggest a close correlation with Tadcaster. However, if it is considered that local

swamp conditions have over-endowed the Cawood peat with Cyperaceae, and to a lesser extent with *Salix*, the nearest approximation is with zone III at Tadcaster.

The prevailing vegetation at Cawood was clearly open, with few trees. Bartley (1962) has cited evidence that the tree-line passed north of Tadcaster at the time of the zone Ic/II transition and remained to the north of the area during the zone III climatic deterioration. Although pollen ratios of tree birches and *B. nana* from Cawood were not determinable, any pre-existing birch woods must have been considerably reduced. It is not possible to assess whether the scarce *Pinus* pollen was locally derived or not, in view of its wide dispersal properties.

Despite aspects of the pollen analyses which suggest that the regional vegetation is not fully represented, there is little doubt, particularly in view of the low Gramineae values, that areas of bare ground existed, probably on the newly formed levee deposits. Such an environment provides one of the essential conditions for the derivation and transport of aeolian deposits.

Acknowledgements

We are grateful to Mr. P. C. Buckland, Archaeological Field Officer, Doncaster Museum and Art Gallery, for helpful discussion on late Devensian environments in adjacent regions and for allowing us to quote the unpublished radiocarbon date from within blown sand at Messingham.

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BOOK REVIEWS

Palaeobiology of Angiosperm Origins: Problems of Mesozoic Seed-plant Evolution by **Norman F. Hughes.** (Cambridge Earth Science Series). Pp. vii & 242, with 73 figures and 8 tables. Cambridge University Press. 1976. £7.80

Charles Darwin once referred to the origin of the higher plants as an "abominable mystery". Dr. Hughes attempts to remove some of the mystique surrounding this mystery. He suggests that what is required to resolve this problem is objective factual investigation, not the formulation of new hypotheses. In particular, he is unsympathetic to the upland origin hypothesis, which postulates that the crucial early phase of angiosperm 'flowering plant' evolution occurred at high altitudes, remote from sites suitable for fossilisation. He believes that such explanatory hypotheses are not only essentially unhelpful, but may be proved unnecessary by more thorough study of available fossil material, specifically that of early Cretaceous gymnosperms, of which "the critical details . . . are little known because little attention has been paid to them."

This book is authoritatively and meticulously written (even though the consistent use of Benettitales instead of Bennettitales is inexplicable), properly documented and admirably produced, with the numerous figures finely drawn. One chapter disposes of claims for pre-Cretaceous angiosperm fossils. Also included, *inter alia*, are chapters on plant fossilisation,

Cretaceous floras, the Cretaceous land fauna (especially the insects), Cretaceous stratigraphy, Jurassic and early Cretaceous gymnosperms, "Early Cretaceous fossil evidence of angiosperm characters" (note this pedantic but precise choice of phrase; such exactitude is characteristic of Dr. Hughes' approach throughout), and late Cretaceous angiosperms.

This last-mentioned chapter is in one sense the most disappointing one in the book since no attempt is made to describe adequately the range of diversity of angiosperm fossils in the late Cretaceous, but in another respect it is the most significant, since Dr. Hughes states, with clear justification, that the referral of angiosperm fossils of this age to no fewer than sixty-odd different extant families requires a very thorough reappraisal. He claims that, if evolution has any meaning, it can in general make little sense to equate fossils that lived some 65 to 100 million years ago with Recent taxa, yet virtually no exclusively fossil angiosperm families have been recognised! The consequences of this situation have been far-reaching, for it has become usual for students of angiosperm phylogeny, faced with the fact that diverse families, including some regarded as 'advanced', apparently make their first entries in the fossil record virtually simultaneously with 'primitive' families, to disregard totally fossil evidence in devising their phylogenetic schemes, which are therefore constructed solely on the basis of evidence from living plants. The moral is plain, but the task of objective analysis of the fossil evidence will be very formidable. That it needs doing is confirmed by a parallel in the ferns, for which Harris has maintained, and others have now accepted, that former referrals of Mesozoic fossils to extant polypodiaceous (advanced) genera were, almost without exception, erroneous, and resulted in a total misconception regarding the time of origin of the modern ferns. Iconoclasm on this scale will not necessarily result from a revision of Cretaceous angiosperm fossils, but nevertheless a profound transformation in our understanding of the course of angiosperm evolution can be expected.

Dr. Hughes' book thus carries a distinctive and individual message. Whether or not he is right in his views, his scholarly book is a unique and valuable addition to the literature. It is stimulating, and will surely prove an enduring source of reference for serious students of this subject. However, it is uncompromisingly written, making few concessions to the reader. Those who need only a simple straightforward account of our present understanding of the origin of the flowering plants must look elsewhere.

J.D.L.

Highland Landforms by **Robert J. Price.** Pp. 110. Highlands & Islands Development Board, Inverness; distributed by Collins, Glasgow. 1976. £2.50. Paperback

This is the third volume in the Highland Life Series. Its stated objective is to "make landforms more interesting to anyone visiting the Highlands and Islands". The first part of the book introduces concepts of geomorphic processes, the evolution of different types of rock, and geological time with reference to the rocks of the Highlands. This is followed by sections on the Preglacial landforms and the ice cover of the area, shoreline changes, glacial erosion and deposition. The main part of the book deals with the underlying geology, salient topographical and geomorphological features of five regions: Grampians, North Central Highlands, Ancient Forelands, North East Highlands with Orkney and Shetland, and Arran and the Inner Hebrides. This is followed by an account of coastal landforms and their distribution, and a short section on landforms as a resource.

The volume is profusely illustrated with 80 photographs, 50 of which are in colour, and with 15 maps and diagrams. Though the photographs are on the whole well chosen and integrated with the text, a few do not reach the standard of reproduction which may be expected in a modern publication. There is a useful reading list and an adequate index. One particularly attractive feature is that all places which are referred to are named on the 1" O.S. maps.

Within the limitations of the volume, Dr. Price has provided much authoritative, yet non-technical, information on how the Highlands and Islands of Scotland have been shaped.

D.E.C.

YORKSHIRE LICHEN MATERIAL OF W. G. McIVOR IN THE HERBARIUM OF THE NATIONAL BOTANIC GARDENS, GLASNEVIN, DUBLIN

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During a recent examination of the herbarium at the National Botanic Gardens, Glasnevin, Dublin (DBN) I discovered a number of interesting specimens collected from Yorkshire. The information provided on the specimens' labels was scant, but they were all written in the same unmistakable hand (Fig. 1). Several specimens were dated 1844-45 and some were annotated with the name 'McIvor' (with or without these dates) in the hand of William Ramsey McNab (1844-1899), Professor of Botany in the Royal College of Science, Dublin, from 1872 until his death, Scientific Director to the Royal Dublin Society, and General Director of the Museum of Science and Art, which included the Botanic Gardens. The Science and Art Museum purchased McNab's herbarium in 1891. The Museum was later known as the National Museum of Ireland, and in 1970 the herbarium was transferred to the National Botanic Gardens at Glasnevin.

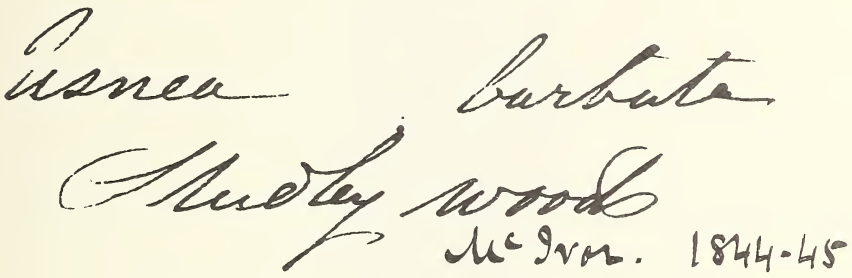


Figure 1. Lichen label from Herb. DBN: nomenclature and location in W. G. McIvor's hand, with collector's name and dates added in W. R. McNab's hand.

William Graham McIvor was born (date unknown) at Dollar in Clackmannanshire. He was a Kew gardener until his appointment as Superintendent of the Botanical Garden at Ootacomund, India in 1848. He produced an exsiccata, *Hepaticae britannicae* in 1847, but he is more widely known for the introduction of the Cinchona plant into India in 1861. His main herbarium is at Kew. He died in Ootacomund on 8th June 1876. Little is known of this botanist: I have been unable to trace any strong relationship between McIvor and McNab, although the former would undoubtedly have worked with, or contacted, members of the McNab family — for example, William Ramsey McNab was the son of James McNab (1810-1878), the eldest son of William McNab (1780-1848) whom he succeeded as Curator of the Edinburgh Botanic Garden. William McNab had also been a Kew gardener prior to his Edinburgh appointment in 1840. Similarly I can find no relationship between McIvor and Yorkshire. Nevertheless, the handwriting accompanying the Dublin herbarium material, when compared with authentic specimens of his handwriting at Kew, is almost certainly that of McIvor.

The lichens so far examined in this collection are listed below; they are particularly interesting from three points of view: (1) they represent, for the most part, species which are

now very rare or extinct in Yorkshire, (2) they provide valuable records for a period (viz. mid 19th century) when lichen recording was at a low ebb, and (3) they can be compared with the late 18th century records of William Brunton (1775-1806) since they are essentially collected from the same hunting grounds (viz. Studley area). Species recorded by Brunton from this area were certainly extinct in the latter part of the 19th century (cf. Lees, F.A., 1888, *The Flora of West Yorkshire*). The luxuriance of the material collected by McIvor in 1844-45 (see Fig. 2) would leave us to believe that there was a dramatic environmental deterioration during the period 1850 to 1875 due no doubt to an increase in atmospheric pollution, and agricultural practices such as deforestation and land drainage.



Figure 2. *Usnea filipendula* Stirt. (as *U. barbata*) collected by W. G. McIvor in 1844-45 from Studley Woods, Yorkshire (Herb. DBN); actual size = 35 cm.

LICHEN LIST

Alectoria capillaris (Ach.) Cromb. (as *A. jubata*) Studley Woods.
A. fuscescens Gyeln. (as *A. jubata* var. *chalybeiformis*) rocks, Grantley.
A. lanestris (Ach.) Gyeln. (as *A. jubata*) "Yorkshire, West Riding, McIvor, 1844-45" in McNab's hand.
A. nigricans (Ach.) Nyl. (as *Cornicularia bicolor*) Ingleborough Hill; note attached to this herbarium sheet in McIvor's hand reads "Lichens all collected in the West Riding of Yorkshire in 1844 & 45 save those to which the localities are attached".
A. pubescens (L.) Howe (as *Cornicularia lanata*) Sawley Moor.
Anaptychia ciliaris (L.) Körb. Studley Woods.
Cetraria glauca (L.) Ach. rock, Grantley Lakes.
C. islandica (L.) Ach. Sawley Moor.
C. nivalis (L.) Ach. Ingleborough Hill.
Cladonia bellidiflora (Ach.) Schaer. Ingleborough.
C. chlorophaea (Flörke ex Sommerf.) Spreng. (as *C. pyxidata*) Ingleborough.
C. coccifera (L.) Willd. near Studley; Sawley Moor.
C. furcata (Huds.) Schrad. Grantley Moor (c.fr.); Studley Woods.
C. gracilis (L.) Willd. Grantley Moor (c.fr.).
C. impexa Harm. (as *C. rangiferina)* Grantley Moor.
C. polydactyla (Flörke) Spreng. (as *C. caespiticia)* Studley Woods.
C. uncialis (L.) Web. Grantley Moor.
Collema flaccidum (Ach.) Ach. Den near Ripon; Studley Woods.
Cornicularia normoerica (Gunn.) Du Rietz Brimham Rocks.
Evernia prunastri (L.) Ach. Studley Wood.
Haematomma ventosum (L.) Massal. Brimham Rocks.
Lecanora chlarotera agg. Brimham Rocks.
Lobaria pulmonaria (L.) Hoffm. Studley Woods.
L. scrobiculata (Scop.) DC. Studley Woods.
Nephroma laevigatum Ach. (as *N. resupinatum*) Ingleborough.
Ochrolechia frigida (Sw.) Lynge (as *O. tartarea*) near Grantley.
Parmelia furfuracea (L.) Ach. var. *ceratea* Ach. near Ripon.
P. physodes (L.) Ach. rocks, Grantley; old walls, Studley.
Peltigera cf. *polydactyla* (Neck.) Hoffm. (as *P. scutata*) rocks, Dallowgill.
P. venosa (L.) Baumg. rocks, Dallowgill.
Physcia pulverulenta (Schreb.) Hampe (as *Parmelia cyclostelis*) rocks, Grantley.
P. tenella (Scop.) DC. em. Bitt. Studley Woods (c.fr.).
Ramalina calicaris (L.) Fr. (as *R. fastigiata)* Sawley Moor.
R. farinacea (L.) Ach. var. *farinacea* Yorkshire Coast, July 1845.
R. fraxinea (L.) Ach. Studley Woods.
R. polymorpha (Ach.) Ach. Rocks near Platley (? Pateley), Yorkshire, July 1845 (some of specimens appear to be attached to bark!); note on herbarium sheet in McIvor's hand reads "This is introduced in Hooker's British Flora on the authority of the Rev. J. Harriman? Yet it is doubtful if the *True Plant* has before been found in Britain?". According to Mr. P. W. James, the material accompanying this label is a tropical *Ramalina* sp. Perhaps *"R. polymorpha"*, in McIvor's interpretation, was collected from this Yorkshire locality, lost, and substituted by foreign material during the herbarium mounting procedure?
R. siliquosa agg. (as *R. scopulorum*) rocks near Hull.
R. subfarinacea (Nyl. ex Cromb.) Nyl. (as *R. farinacea*) Sawley Moor.
Solorina saccata (L.) Ach. Brimham Rocks.
Sphaerophorus globosus (Huds.) Vain. stones, Grantley Moor.
Sticta sylvatica (Huds.) Ach. rocks, Studley.
Thamnolia vermicularis var. *subuliformis* (Ehrh.) Schaer. Grantley Moor.
Umbilicaria hyperborea (Ach.) Hoffm. (as *U. deusta*) Ingleborough.
U. polyphylla (L.) Baumg. Ingleborough.

U. polyrrhiza (L.) Fr. Ingleborough.
U. proboscidea (L.) Schrad. (also recorded as *U. cylindrica*) Brimham Rocks.
Usnea filipendula Stirt. (as *U. barbata*) Studley Woods; Woods north of Platley (? Pateley), 1845 — note in McIvor's hand reads "in fruit which is new to Britain".
U. subfloridana Stirt. (as *U. florida*) Studley Woods; Woods north of Platley (? Pateley), 1845.

ACKNOWLEDGEMENTS

I wish to record my thanks to the Director of the National Botanic Gardens, Glasnevin for permission to work on the collection, to Miss M. Scannell for considerable help in the preparation of this paper, to Dr. D. N. Pegler for supplying me with specimens of McIvor's handwriting as photocopies from the Kew collection, to Mr. B. J. Coppins, Mr. P. W. James and Dr. D. L. Hawksworth for confirming/determining the more critical lichen material, and to Miss S. Alexander for preparing the figures.

BOOK REVIEW

Lichens as Pollution Monitors by **David L. Hawksworth** and **Francis Rose.** Pp. 60 Edward Arnold: Studies in Biology no. 66 (Sponsored by the Institute of Biology). 1976. £2.80 hardback, £1.40 paperback

The use of plants and animals as indicators of environmental pollution is widely known, and the value of lichens in such analyses has received considerable attention, at times overrated, during the past decade. This book presents a concise account of the general nature (morphology, physiology and ecology) of lichens, and the effects of major pollutants, such as sulphur dioxide, fluorides, car emissions, heavy metals and fertilizers, on their past and present ecological and distributional status (mainly in the British Isles).

Since interpretation of lichen status is dependent upon a complexity of factors, due attention is also paid to such topics as climate, topography and habitat management (including the introduction of man-made substrates). Perhaps too much attention is given in this book to the disappearance of lichens; no mention is made of the value of lichens as indicators of ameliorating conditions where, for example, a significant fall in air pollution level has followed the implementation of the Clean Air Act.

The major disappointment of this work stems from the limited room imposed by the format of this series; surely such complex subject matter demands more in-depth treatment? At times the text lacks cohesion in the interests of brevity, and the note-like treatment of lichen identification suffers in particular, e.g. "*Lecidea lucida*, forming bright yellow stains on brickwork and *Lecanora expallens*, forming neat C+ orange (i.e. C positive reaction) yellow-green patches on trees" is both erroneous and confusing. Perhaps much of the section on lichen identification could have been omitted in the interests of a more comprehensive coverage of the subject in question, although it is appreciated that reference to identification guides is essential in field studies involving diversity counts.

In general this book provides a satisfactory introduction to the subject. The inclusion of practical exercises, with due consideration to conservation, will be welcomed by students involved in school and college projects, and by naturalists requiring information on how to measure environmental deterioration.

M.R.D.S.

THE HERON POPULATION OF YORKSHIRE 1970 — 1975

T. R. BIRKHEAD, M. E. BIRKHEAD and J. R. HART

Introduction

A National Census of Grey Herons *(Ardea cinerea)* in Britain has been carried out each year since 1928 (Stafford 1971, Reynolds 1974). The 'normal' breeding population of England and Wales is approximately 4,500 pairs, although numbers may fall as low as 2,000-2,500 after a hard winter, such as 1946-47 or 1962-63 (Stafford 1971). Providing no further cold winters intervene, the population regains its former level within two or three years. Lack (1954) has explained this pattern in terms of density dependent mortality; the most likely mortality factor being a shortage of food during hard winters.

In 1966 it was thought that recovery from the hard 1962-63 winter had been unusually slow, and that heron numbers in Yorkshire had reached a critically low level (Gunton 1966) — possibly associated with the high levels of toxic chemicals that had been found in heron tissues and eggs (Prestt 1970). In order to check this a census of the heron population and a review of the bird's status in the county were conducted (Birkhead 1972). The results of censuses in 1970 and 1971 showed that by 1970 recovery from the 1962-63 winter was complete, and that by 1971 numbers were higher than at any other time since 1940.

The aim of this paper is to present details of heron numbers in Yorkshire between 1970 and 1975. The area concerned is that which lies within the pre-April 1974 county boundary.

Methods

Each year from 1970 to 1975 we attempted to count all occupied nests in each heronry. Of the eleven main colonies (Table 1), we counted the same eight in each year. The other three colonies were counted by other individuals (see Acknowledgements), but in most cases the same observers counted the same colonies each year. Our counts were made at the same time each year, during the first week of April. Counts at the other colonies were made at a similar time but often involved a second count later in the season.

In the larger colonies counting was facilitated by marking nesting trees with temporary labels as we walked through the wood. The number of nests was counted as the labels were attached to the trees and recounted as we retraced our steps, removing the labels. In small colonies we each made independent counts and carried out a re-count if there were any discrepancies.

Results

The number of occupied nests in each heronry is shown in Table 1. Three 'new' heronries were located during the study period. The first at Reeth in Swaledale (B. W. Fox, pers. comm.) in 1970, a second at Dob Park in the Washburn Valley in 1971, and the third at Huggan Ing, Sawley in 1972. This is probably a continuation of the Gisburn and Bolton by Bowland colonies (see Birkhead 1972). It is interesting that herons also bred in Dob park during the early part of the nineteenth century (Nelson 1907).

No colonies declined to extinction between 1970 and 1975 although Coniston Cold showed a dramatic decline between 1974 (39 pairs) and 1975 (two pairs). The Coniston Cold colony is of interest, and it seems worthwhile recording some details. Nelson (1907) recorded a heronry at Flasby, near Gargrave (in the vicinity of Coniston Cold) in 1865. The location of the colony varied over the years, but in about 1961 the site was felled, and it was not until 1967 that the present site was found. In 1970 we counted a minimum of 25 occupied nests at Coniston Cold. However, in 1971 we noticed herons performing aerial display flights over two small woods approximately one mile north-west of the heronry (site A in Fig. 1.). On further inspection we found that both woods (B and C in Fig. 1.) contained herons nests. Wood C, which consisted almost entirely dead larch, held about 20 nests, some of which were very

	Colony	1970	1971	1972	1973	1974	1975
1	Kirkby Fleetham	26	36	50	37	42	34
2	Sleningford	10*e*	19	18	13	16	8
3	Coniston Cold	25	50	41	31	39	2
4	Dob Park	—	4	10	6	14	11
5	Helaugh	12	24	34	40	52	40
6	Scampston	12	17	24	25	23	24
7	Kirkdale	15	30	32	35	25	20
8	Sproxton	0	4*e*	5*e*	1?	nc	0
9	Sawley	3*e*	7*e*	11	15	24	20
10	Reeth	4	6	8	9	3	2
11	Sedbergh[1]	10*e*	26	26	27	20	14
12	Hornsea	2?	0	0	1	0	?
13	Dacre	?	?	?	2	0	?
14	Market Weighton	—	—	—	1	—	—
15	Dent Bank	1	1	0	0	0	0
	Totals	120	224	259	243	258	175

Table 1. The number of pairs of herons breeding in Yorkshire 1970 — 1975.

Notes: *e* = estimate, nc = no count, — = no birds bred, ? = no data.

[1] Sedbergh: this colony was previously recorded as lying within the county boundary (Birkhead 1972), but in fact lies just outside the county. It is included for the sake of completeness.

large and must have been occupied for several years. However, no herons were recorded breeding in wood C in 1971 — 1975 (presumably because the trees were dead), but wood B was occupied in each year of the study. It seems possible that after the Gargrave site was felled in 1961 herons colonized wood C, remaining undetected. Woods A and B were presumably occupied later. Thus the figures for 12 pairs in 1967 and 25 in 1970 (Birkhead 1972) are probably under-estimates for the Coniston Cold area (i.e. woods A, B and C) as a whole.

In 1971 we found a dead heron hanging from the uppermost branches of a tree in wood A, and thought that the bird might have been shot. In subsequent years the understorey in wood A was cleared and fires were found burning under the nesting trees during the breeding season. It seems likely that this disturbance led to the gradual abandonment of this site. No birds bred in wood A in 1974 and in 1975 only two pairs bred in wood B. The birds will almost certainly find an alternative site in the area, although it may be several years before it is located.

The Sproxton site remains something of a mystery; on each visit to the small larch plantation we have seen adult herons and have counted between three and five nests. However, breeding has not been confirmed in any of the six years.

A single pair of herons nested at Market Weighton, and two pairs near Pateley Bridge in 1973. Single pairs were also recorded at Dent Bank, near Middleton-in-Teesdale in 1970 and 1971, but these seem to represent the remnants of a larger colony, since five pairs bred at this site in 1968 (P. Corkhill, pers. comm.).

DISCUSSION

The figures for the period 1971 — 1975 (excluding Coniston Cold) probably reflect real changes in the population. The huge increase between 1970 — 1971 needs some further explanation. The increase was probably due to a combination of two factors:

(a) A genuine increase in the population. Reynolds (1974) in his analysis of the National Heronry Census figures has shown that during the period 1970 — 1971 numbers in other areas of England and Wales also increased. In addition, the discovery of three new Yorkshire colonies during the study period also suggests an increasing population.

(b) Observational bias. We conducted the census for the first time in 1970, and in retrospect we feel that the figures for that year, for the larger colonies in particular, are too low. During the course of 1970 our ability to recognize new nests and occupied old nests increased. Thus the actual rise in heron numbers between 1970 and 1971 was probably less marked than Table 1 indicates.

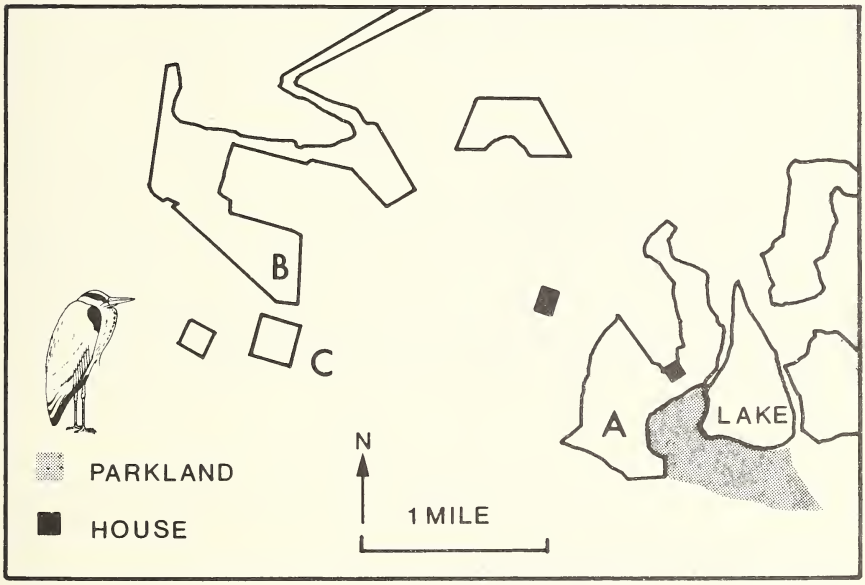


Figure 1. Map of Coniston Cold area showing woodland (enclosed areas) and the location of woods A, B and C used by nesting herons.

Notwithstanding, the data for 1971 — 1975 indicate that the heron population was considerably larger than it was between 1940 — 1957 (see Birkhead 1972). As already pointed out, the figures for the rest of Britain (Reynolds 1974) show that there has been an overall increase in the heron population, although the magnitude of these changes was less than those recorded in Yorkshire. We feel that by including recently constructed nests in our counts, this may have exaggerated the discrepancy between the 1940 — 1957 figures and those for 1971 — 1975. It should be pointed out that recently built heron nests can be easily over-looked since they consist of only a few twigs, such that the eggs are often visible through the bottom of the nest (see Milstein *et. al.* 1970). Because we did not recognize these

structures as occupied nests in 1970, during the initial stages of our work, it seems possible that observers during the 1940 — 1957 period also failed to recognize them.

Thus to conclude; the heron population in Yorkshire was probably slightly higher during 1971 — 1975 than it was between 1940 — 1957. The increase has occurred sometime since the 1962-63 hard winter, and not dramatically between 1970 and 1971 as Table 1 suggests. A decrease in the population occurred between 1974 and 1975, which (excluding Coniston Cold) amounted to about 21%. The reason for this decline is not clear.

ACKNOWLEDGEMENTS

We are particularly grateful to all those individuals who have helped us in this study; J. Ainsworth, R. W. Brock, H. O. Bunce, P. Corkhill, B. W. Fox, T. G. Gunton and D. T. Ireland.

SUMMARY

The number of herons in Yorkshire probably increased between 1970 — 1971. The population remained at about 250 pairs between 1971 — 1974, and then decreased by 21% between 1974 — 1975. Numbers were probably higher during the period 1971 — 1975 than between 1940 — 1957. However, the difference in the population levels in these two periods is difficult to assess, because of possible differences in census methods employed.

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BOOK REVIEW

A Guide to the Birds of Panama by **R. S. Ridgely,** and illustrated by **John A. Gwynne.** Pp. 393, with 32 colour plates, black and white illustrations and end-plate maps. Princeton University Press. 1976. $15.00

Slightly smaller than Scotland, the Republic of Panama (including the Canal Zone) lists over 880 species of birds, of which about four fifths are resident breeders. This book is both a general introduction to the avifauna, and a practical field guide. Short chapters covering the earlier literature, climate, migration and local movements, and conservation issues are followed by a Plan of the Book, which describes the terms used and provides ecological notes on the habitats. The bulk of the text is a species-by-species catalogue, with short introductory notes on each family and detailed notes on each species; the latter include description, status and distribution, habits, range, and additional notes on taxonomy, vernacular names and other points of interest. The colour plates give clear, unpretentious illustrations of 523 species (regrettably fewer than the "over 650 species" claimed by the blurb), and there are attractive line-drawings throughout the text. Appendices include a list of species of neighbouring countries which might be expected to turn up in Panama, and practical hints for bird-watching and bird-finding in a country which does not provide ready access to travellers. The book ends with a short bibliography and a full index. An attractive guide, well produced and moderately priced; though more cumbersome than the average British or American field guide, it would still be a useful book to take into the field, and is a welcome addition to the library of American birds.

B.S.

SALMON IN THE HUMBER TRIBUTARIES

C. A. HOWES

The numerous fisheries of medieval and later vintage established along the Trent, Don, Aire and Ouse demonstrate that salmon traditionally made spawning runs up the major tributaries of the Humber [1 2] but due to the effects of navigation developments and, since the mid 19th century, pollution in the river systems of South and West Yorkshire, most of these fisheries rapidly failed. The Ouse netsmen, however, continued to exploit the dwindling migratory runs passing through to the clean waters of the Derwent, Wharfe and Ure until the late 1930's, by which time the increased effluent flow entering the lower Ouse from the Don, Aire and Calder had substantially depleted these stocks.[3]

In 1965 the Yorkshire River Authority, on behalf of game fishing interests, instigated its scheme to re-introduce salmon into the Ouse system. Annually, eyed ova purchased from the Kyle of Sutherland Fishery Board are hatched and reared for 6-7 months at the Authority's hatcheries at Pickering. At about 5 cm. in length the fry are introduced into tributaries of the River Ure in Wensleydale, these tributaries having previously been cleared of native trout (potential predators and competitors) by electro-fishing. After two years the salmon smolts migrate down stream, a proportion being caught and tagged at Mickley. These are transported overland past the pollution zone in the lower Ouse and placed into the Humber estuary at Brough Haven to continue their seaward migration.

To date most recaptures of tagged fish have come from the Greenland fisheries, the number reported from home waters being substantially lower than for similar schemes elsewhere in Britain. Possible explanations for this phenomenon could be disorientation and mortality of returning fish caused by pollution in the Humber and lower Ouse and the failure to scent-imprint the migratory route from the (adopted) spawning river through being artificially transported into estuarine waters at the smolt stage.[3]

The following table, based on information in the Yorkshire Water Authority report[3] gives data on the scale of fry stocking into the River Ure, numbers of smolts tagged and details of reported recaptures 1965-75.

Year	No. of fry stocked	No. of smolts tagged	Recaptures
1965	57,000		
1966	150,000		
1967	201,000	500)	Numerous unspecified recaptures chiefly from Greenland fisheries.
1968	289,000	689)	
1969	200,000	1,248)	
1970	19,000	3,980	Greenland 19, Scotland 2, Cumberland 1, Northumberland 7, Yorkshire (locality unspecified) 2, Humber estuary 3, River Ure 2, River Trent 1.
1971	200,000	969	Greenland 2, Scotland 2, Cumberland 1, Northumberland 1, River Ure at Wensley (*Naturalist* 1972, p. 10).
1972	140,000	1,320	Greenland 8, Eire 1, Scotland 1, Cumberland 1, Northumberland 1.
1973	150,000	2,139	Greenland 2, Norway 1, N. Ireland 1.
1974	170,000	3,000	Labrador (Canada) 1, River Ouse (Yorks.) 1
1975	30,000	1,352	No records reported.

The considerable discrepancies between stocking numbers and the numbers of smolts tagged two years later are no doubt mainly accounted for by natural mortality, but it is possible that large numbers of smolts manage to by-pass the Mickley fish trap (particularly when runs take place during periods of high water) reaching the sea unaided. If this does happen it could in turn account for the recent noticeably larger runs of salmon up the Humber. Evidence from sight and angling records shows that there is now a sufficient volume of in-coming salmon to enable a successful, if small, annual spawning run up the Ouse system.

During February and March 1975, salmon were seen attempting to negotiate the Stamford Weir on the Derwent and Mr. A. Kitchen (pers. comm.) has in recent years seen and caught salmon parr in the upper Derwent, giving actual proof of successful spawning. Two salmon found dead in the Wharfe at Boston Spa in 1975 were thought to have spawned and a large-scale seaward migration of smolts during May 1976 on the Wharfe at Appletreewick is further evidence of successful spawning.

Water pollution still remains a major hazard as evidence by the two dead salmon in the Trent[1], one dead on the Ouse mud at Goole in 1975 (pers. comm. A. Shaw) and the most recent specimen, a dead 10lb female found by the author and W. Bunting Jun. on 12th May, 1976, amongst domestic and industrial flotsam on the low water mud of the River Don, upstream of its confluence with the River Went (grid ref. SE6618). The fish tagged as a two year old smolt on the Ure in 1974 is now in Doncaster Museum where the following measurements were taken by Mr. A. White: total length 793mm, standard length 670mm, greatest depth 200mm, length of head 145mm, length of snout 47mm, diameter of eye 15mm. Although dead, like the Trent specimens[1], the presence of this fish shows that natural recolonisation of the rivers of industrial South and West Yorkshire could occur if pollution levels were reduced.

I gratefully acknowledge the help given by Stephen Bailey and John Hicks of the Yorkshire Water Authority Fisheries department in providing the information on the Ouse salmon re-introduction and tagging scheme.

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[1]Bunting, W. Jun., Hanson, M., Howes, C. A., and Kitchen, A. 1974. The history and distribution of fish in the Doncaster district. *Naturalist* 41-55.

[2] Howes, C. A. 1975. When the rivers sparkled. *Dalesman* 533-4.

[3] Yorkshire Water Authority Regional Fisheries Advisory Committee. Reintroduction of salmon into the River Ouse. 27/10/1975.

BOOK REVIEW

Aphids by **R. Blackman.** Pp. 175. Ginn & Co., London. 1974. £3.00

Roger Blackman has written a useful introduction to the biology of aphids. These common insects have been difficult to find out about for far too long. This little book puts this to rights.

The first nine chapters deal with the biology of aphids, their life-cycles, genetics, feeding, enemies and so on. Each chapter gets about seven pages of text and drawings.

The most useful section of the book by far for me, and I suspect for other naturalists, is the list of British aphids. This is laid out so that the species can be determined from a knowledge of the host plant on which the aphid was breeding. If more than one aphid species is found on a plant, then the aphids are ranked commonest first.

The final two sections of the book describe the use of aphids as experimental animals, and would be of interest to biology teachers.

There are seven colour plates of aphids and one plate of aphid colonies on plants. This latter is quite valueless since the poor printing has effectively concealed the colonies!

For a non-technical introduction to the biology and identification of this large and interesting group of insects this book is recommended despite its price.

M.J.C.

KILLDEER ON THORNE MOOR: A BIRD NEW TO YORKSHIRE

S. L. JAMES & MARTIN LIMBERT

On 29th November 1975, SLJ was watching birds at the Shoulder O' Mutton Well area on Thorne Moor. This is a derelict and flooded area of peat-cuttings comprising treacherous peaty mud and raised drier parallel strips between, with *Juncus effusus* and *Betula*. Because of the dry summer, water levels were low and rushes were invading the muddy areas with vigorous new growth.

A medium sized wader was noticed running about on the muddy area, about 55 metres away from the observer. Its rufous orange rump and tail, brown and white head pattern and black double breast-band immediately suggested Killdeer, *Charadrius vociferus*. The bird was watched as it made short runs, stopping periodically to feed, and it was eventually seen to within about nine metres range. Later the same day several observers, including ML, saw the bird in the same place under cold and dry but sunny conditions with a very light west wind. The identification was confirmed and a full description was taken. ML returned on 30th., a day of fog and heavy frost with a light southerly wind; again a few other observers were present, and the Killdeer was eventually seen in mid-morning, to within about five metres range and further notes were made.

The following description is an amalgamation of notes taken by the writers on 29th and 30th November. This has been accepted by the Ornithological Section of the Yorkshire Naturalists' Union and the *British Birds* Rarities Committee. The general appearance was of a large and elongated Ringed Plover, *Charadrius hiaticula*; an impression emphasised by the long wings and tail and the relatively long spindly legs. The head was patterned brown, black and white; the forehead was black, the crown, upper nape and cheeks brown, with a white patch from above the central part of the eye to just behind it. The bird had another white patch below the black forehead as in Ringed Plover. This extended under the eye as a thin line, almost meeting with the eye patch. The eye itself was black, with a red orbital ring. The bill was blackish, about three quarters of the length of the head. The throat, sides of the neck and lower nape were white, which contrasted sharply with the black and white breast pattern. The upper breast band was black, being thinnest around the back of the neck, gradually becoming broadest at the centre of the breast. Below this was a relatively thin white band, followed by a second breast band, the same shape as the upper one, but ending abruptly on the mantle. This lower band was black at the sides, becoming slightly brownish in the centre of the breast, and its lower edge was slightly ragged in appearance. Below the bands the underparts were white. The legs were flesh coloured when clean and the claws were black.

The upper parts were brown and slightly mottled, an effect due to paler feather edgings. The primaries were black and when at rest some of the white secondaries could be seen on the left hand side of the bird. The rufous-orange tail had a black sub-terminal band. The long, very pointed wings had their leading edges (to the carpal joint and back to the coverts) brown. with the rest of the front of the wings black, as also were the entire trailing edges. In between these was a long and conspicuous white wing-bar appearing to extend along the entire length of the wing. The underwing was seen to be uniformly pale.

When the bird was in flight the rufous-orange tail and rump showed to advantage, the rufous area extending from an inverted V-shape on the back down the long, graduated tail as far as the black subterminal band. The tail-feathers were individually pointed — almost fingered — at their extremities. They were white beyond the black band with dark shafts, but the tips of the innermost feathers were wholly dark. The undertail was pale with a dark area either a patch near the tip or a terminal dark band. From the above description the bird appears to be an immature specimen, with less black on the head for example, than a typical adult would have, and with the upperparts appearing decidedly "scaly".

On 29th it was noted that the bird generally called when flushed and the usual call was a short trilling one, but nevertheless quite loud, rendered "Killdededede. . . ". Once the call

sounded like "Keerkitideerdeerdeer . . .". Sometimes the call, was heard when the Killdeer was invisible to us and therefore not directly disturbed by human presence. On 29th a flight call was also heard, a repeated "Too-eet", but it was only uttered occasionally. This latter call was also heard on 30th, both while the bird was flying and at least once from the ground. A very similar call was noticed on the latter date, a piping "Tuu-eur" or "Tluu-eur", and all this group of calls is probably comparable with the "Tuu-reep" call of Ringed Plover.

On 29th the Killdeer was relatively tame, a notable feature of this species. If we moved carefully it was not unduly perturbed, and if it was flushed, it never flew far. It was watched mainly as it fed amongst young rushes and on the more open, very soft peaty mud, which at times sagged under the bird's weight. It hunted rather furtively and rapidly, repeatedly bowing its head to the ground to probe shallowly or to peck at something on the surface. The Killdeer frequently employed the technique of foot-trembling to disturb prey. On the cold and frosty 30th the Killdeer behaved in a similar way, dipping its head quickly and repeatedly to feed, ranging widely in impatient runs in its search for food and still employing foot-trembling, despite the ice. The bird also spent some time preening, thus displaying various parts of its plumage in turn.

The Thorne bird is the twentieth record for the British Isles, and is an addition to the Yorkshire list. Sharrock (1974), analysing the British and Irish records of this mainly North American species from 1958 to 1967 states that all seven Killdeers recorded in those years were first recorded in November, February or March. The Thorne bird fits this pattern and was most probably blown off course *en route* for its winter quarters which extend as far south as Peru.

A visit on Thorne Moor on 3rd December failed to reveal the bird, and it was not seen subsequently. However its brief stay has placed the species firmly on the Yorkshire list, in a year that will be remembered as being outstanding for American vagrants.

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BOOK REVIEW

The Biology of Insects by **C. P. Friedlander.** Pp. 189 with many line drawings. Hutchinson. 1976. £4.95

This book is one of a new series of introductory studies in the biological sciences designed for undergraduate students in universities and polytechnics. Dr. Friedlander sets out to partly fill the gap that exists in the information available to students about the nature of insects as animals that are perfectly adapted to life on land, and their influence on man's economy stemming from the perfection of their adaptation. The first part of the book deals with those aspects of insect biology that are relevant to this purpose and the second part deals at length with economic entomology, examples being drawn from agriculture and medicine.

I found this book easy to read; Dr. Friedlander writes fluently and he is never dull. The production of the book is excellent and the line drawings which admirably support the text are clear and easy to follow. Although the book is intended for students who have already attained advanced level in biology it can be recommended as supplementary background reading for anyone wishing to learn about the lives of insects and their effect on man.

R.C.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1976

EASTRINGTON, V.C. 61 — JUNE 12th

A day was spent amongst the flat, arable fields of East Yorkshire at Eastrington and Sandholme, near Gilberdyke. Mr. David Murray led a party of twenty-four members in hot, sunny conditions, to a number of patches of waste, or unused ground in the vicinity, including the old Hull to Barnsley railway line, various ponds, the Market Weighton Canal, the remains of Ings Wood, just east of Eastrington, an old brick works and the disused railway station near Gilberdyke — so there was plenty of scope for Naturalists.

Afterwards, members met for an excellent tea at the Black Swan Inn at Eastrington. Our President, Dr. J. D. Pickup, took the Chair at the meeting afterwards. Miss Eva Crackles formally thanked Mrs. Watson, of Eastrington, for her valuable help prior to the visit, and Mr. David Murray, our new Divisional Secretary for V.C. 61, who had led us during the day.

Flowering Plants (Mrs. J. E. Duncan)

During the excursion visits were paid to a number of interesting habitats in three 10 km grid squares. The walk to the old railway line to the east of the village led through SE/73 to SE/72, passing a pond on the way. On the old track there were sandy areas and some evidence of chalk. The large number of species recorded included: Kidney Vetch *(Anthyllis vulneraria)* and Bird's-foot Trefoil *(Lotus corniculata)* in very good flower, Fairy Flax *(Linum catharticum)*, Twayblade *(Listera ovata)*, Rat's-tail Fescue *(Vulpia myuros)*, Silver Hair Grass *(Aira caryophyllea)* and Black Grass *(Alopecurus myosuroides)*.

The brick pond in SE/72 was being drained, but there was a lush vegetation of weeds and casuals on the disturbed land round about. Amongst them were: Swine Cress *(Coronopus squamatus)*, Tall Rocket *(Sisymbrium altissimum)*, Oxford Ragwort *(Senecio squalidus)* Feverfew *(Chrysanthemum parthenium)* and Black Grass.

In SE/83 the Market Weighton canal and its surroundings were seen, with Yellow Water Lily *(Nurphar lutea)*, Broad-leaved Pondweed *(Potamogeton natans)* and Curled Pondweed *(P. crispus)* in the water and Water Dock *(Rumex hydrolapathum)* on the bank. Beaked Hawk's-beard *(Crepis vesicaria ssp. taraxacifolia)** was near the canal, and Deadly Nightshade *(Atropa belladonna)**, probably bird sown, was found on rough ground in the vicinity. On the site of the old railway station on the way back to the village the three most interesting species were Lesser Swine Cress *(Coronopus didymis)**, Early Forget-me-not *(Myosotis ramosissima)* and Pale Toadflax *(Linaria repens)**. Pink Water Speedwell *(Veronica catenata)** was reported from a ditch near Ings Wood.

Species indicated by an asterisk are new to the *Atlas* for SE/83.

Other species not recorded in the *Atlas* for squares visited are:

SE/72: *Viola arvensis, Linum catharticum, Lycopus europaeus, Chrysanthemum parthenium* and *Listera ovata.*

SE/73: *Armoracia rusticana, Arabidopsis thaliana* and *Vulpia myuros.*

Insects (J. H. Flint)

The morning was spent in good conditions for insect collecting along the old railway line west of Eastrington. In an area of arable land, this line clearly forms a linear habitat which supports a wide range of common insects and these were plentiful. Eleven species of butterfly were seen here, including Red Admiral *(Vanessa atalanta* L.) and Small Copper *(Lycaena phlease* L.*)*. Among the moths were the Burnet Companion *(Euclidia glyphica* L.), Latticed Heath *(Semiothisa clathrata* L.*)* and Beautiful Carpet *(Mesoleuca albicillata* L.*)*. The flies *Dioctria rufipes* Deg. and *Helophilus lineatus* F., the large black and red hopper *Cercopis vulnerata* Gmel. and the wasp *Crossocerus leucostomoides* Rich. were the only insects seen worth noting.

The flooded workings at Sandholme were less productive and although many of the insects seen in the morning were found again here only quite common and generally distributed species were noted.

Ornithology (A. E. Shaw)

The morning was spent west of Eastrington, on the disused Hull to Barnsley railway track. Only common species of birds were seen: Swift, Swallow, House Martin, Yellowhammer, Turtle Dove and Whitethroat. There were three small ponds at the edge of the old railway track, and these produced Coot, Moorhen, and six pairs of Reed Warblers.

After lunch, we visited the Market Weighton Canal, two ponds at Sandholme, Newport Brick Ponds, and Ings Wood, between Sandholme and Eastrington. The Market Weighton Canal had Mallard with three young, Mute Swan with two young and two male Tufted Duck. Three pairs of Reed Warblers were recorded on each of the two ponds at Sandholme. Two pairs of Little Grebes, one pair with three young, and five male Tufted Duck were on the pond north of the Sandholme road.

Newport Brick Ponds were by far the most interesting area in the day. Five adult Great Crested Grebes were seen there with one young, so a possible three pairs were nesting; eleven Mallard, three pairs of Tufted Duck, Kestrel, Sand Martin, Pied and Yellow Wagtails, Willow Tit, Chaffinch (an uncommon bird in the area), Sedge Warbler and sixteen pairs of Reed Warblers.

A short visit was made to Ings Wood in the late afternoon, where Lesser Whitethroat, Blackcap, Willow Tit, Common Partridge, Robin and male and female Cuckoo were seen. In all, fifty four species were recorded.

BOLTBY, V.C. 62 — JUNE 27th

The Union's visit to the delightful village of Boltby, near Thirsk on the edge of the Hambletons, was only the second this century. In glorious weather, and led by Mr. G. Simpson of the Forestry Commission, and Mr. Ian Lawrence, we walked through deciduous and coniferous woodlands, along a forest road to Boltby Reservoir and returned through grass pastures.

We then proceeded to the Golden Fleece Hotel, in Thirsk Market Place, for tea. Mr. G. Shaw took the Chair at the meeting afterwards, at which there were twenty-four members. Mr. L. Magee expressed a vote of thanks to Mr. Ian Lawrence, our Divisional Secretary for V.C. 62, for organising the day and to Mr. G. Simpson who had guided us.

Flowering Plants (I. C. Lawrence)

The day was fine and warm as the whole party set off along the forest road about half a mile, in a northerly direction, from the village of Boltby. We made for the small reservoir one and a half miles away, where we had our picnic lunch. Some one hundred species were recorded along these track sides and in nearby ditches. In spite of the dry conditions, most of the plant life appeared to be thriving, but rather ahead of the normal flowering time.

The most interesting find during the morning was Chickweed Wintergreen *(Trientalis europaea)*. Spotted Orchids *(Dactylorchis fuchsii)* were frequent along the way; Lesser Spearwort *(Ranunculus flammula)* and Marsh Marigold *(Caltha palustris)* were seen by the reservoir.

After lunch, more open ground was visited and here we crossed from square SE 48 to SE 58, where a calcareous marsh proved interesting. Earlier in the year, Mealy Primrose *(Primula farinosa)* had been seen here by Mr. Gordon Simpson the Forester, but there was no sign of it by this time. However, Ragged Robin *(Lychnis flos-cuculi)*, Marsh Valerian *(Valeriana dioica)*, Cotton Grass *(Eriophorum angustifolium)* and three sedges, *Carex hostiana, C. lepidocarpa* and *C. disticha* (the last being very unusual for this part of the country) were found.

On a nearby bankside, several lime-loving plants were recorded including Rockrose *(Helianthemum chamaecistus)*, Hoary Plantain *(Plantago media)*, Wild Thyme *(Thymus drucei)*, Salad Burnet *(Poterium sanguisorba)* along with another unusual plant for this area: Heath Grass *(Sieglingia decumbens)*. The excessive heat of the day prevented any further distance being covered. In all, one hundred and eighty three species were recorded.

Plant Galls (F. B. Stubbs)
The more common mite galls on the leaves of Alder, Maple and Sycamore were all in evidence, and early specimens of the midge galls on Nettle and Meadow-Sweet were seen. No unusual examples were included among the 16 galls recorded.

Bryophytes (F. Branson)
Although no very exceptional mosses were seen, a number of interesting species turned up, which were very pleasing to see. Owing to the very hot weather, most of the specimens were in a dried up and unrecognisable condition, except in some of the wetter situations. The species recorded on this day could well be described in the words of the 1948 report "The list of bryophytes contained very few of any but the commonest mosses and hepatics. Over fifty species of mosses were gathered on the Boltby walk . . ."

Cratoneuron commutatum var. *commutatum* occurred plentifully on the sides of a wet ditch, which also produced *Pohlia wahlenbergii, Bryum pseudotriquetrum* and a small amount of the thalloid hepatic *Riccardia pinguis*.

On the wall of the reservoir was a patch of very dried up *Grimmia pulvinata*, in fruit. On a dry limestone bank was a slight hollow which was lined with *Weissia controversa*, with abundant capsules. The rudimentary peristome, one of the characteristics of this species, could be seen with a hand lens. By the side of a small stream I collected *Depranocladus uncinatus*. Miss Robertson collected a number of mosses from marshy places among which was *Climacium dendroides*. Some of the other species recorded were: *Atrichum undulatum, Fissidens taxifolius, Dicranella heteromalla* (c. fr.), *D. varia* (c.fr.), *Barbula fallax, Tetraphis pellucida, Orthodontium lineare* (c. fr.), *Eurhynchium rusciforme, Sphagnum subsecundum, Calypogeia muellerana, Lophocolea bidentata, L. heterophylla,* and *Cephalozia bicuspidata*.

Lepidoptera (Mrs. J. Payne)
Because of the high temperatures, not much ground was covered and, although the list is not quite so good as that of 1948, it should be borne in mind that the previous meeting was also in very good weather and covered four days in May, when a wider variety of habitats was visited.

In total, twelve species of butterfly were taken, or reported as imagos: Large White *(Pieris brassicae)*, Small White *(Pieris rapae)*, Green-veined White *(Pieris napi)*, one male Orange Tip *(Euchloe cardamines)*, four well-worn specimens were seen of the Wall *(Pararge megoera)*, frequent Meadow Browns *(Epinephele ianira)*, one Small Tortoiseshell *(Vanessa urticae)*, Red Admiral *(Pyrameis atalanta)*, Painted Lady *(Pyrameis cardui)*; Two Peacocks *(Vanessa io)*, a few males of the Common Blue *(Polyommatus icarus)* were flying near the reservoir, and about half a dozen Large Skippers *(Augiades sylvanus)* were flying about on the lane side near the start of the walk.

The spectacle of the day was the flight of the Bordered White moth *(Bupalus piniarius)* round the higher branches of the Scots Pines. At an estimated thirty per tree, the forest must support a tremendous population. A few were captured flying along the forest road.

The Silver Ground Carpet *(Xanthorhoe montanata)* was noted several times, at rest on herbage. The Chimney Sweeper *(Odezia atrata* L.*)* was in fine condition, flying on pasture and verges. The Silver Y *(Plusia gamma)*, Brimstone Moth *(Opisthograptis luteolata)* and Common White Wave *(Cabera pusaria)* were seen. Web-dwelling larvae were seen on Bird Cherry in a cut hedge, but on the whole, not many Bird Cherries were affected. An Elephant Hawk Moth larva *(Deilephila elpenor)* was taken.

Ornithology (G. E. Alderson)
As the area was predominantly woodland, birds favouring this habitat were most common. Carrion Crows were fairly numerous: five or six being in one tree, together with many others in flight. The day was bright and sunny. No owls were seen, as there was plenty of very dark woodland in which they could rest up during the day. Kestrels, the only raptors, were seen

several times; the Collared Dove was heard, but not seen. The reservoir was visited, but there were no birds on the water.

The list for the day included: Carrion Crow, Magpie, Woodpigeon, Stock Dove, Lapwing, Lesser Black-backed Gull (flying over), Kestrel (two or three, at least), Moorhen, Song Thrush, Blackbird, Starling, Pheasant, Swift, Swallow, House Martin, Chaffinch, Tree Pipit, Meadow Pipit, Chiffchaff, Blackcap, Willow Warbler, Robin, Grey Wagtail, Yellow Hammer, Whitethroat, Bullfinch, Blue Tit, Coat Tit, Redpoll, Tree Creeper, House Sparrow, Wren, Goldcrest, Marsh Tit and Collared Dove.

FISHLAKE, V.C. 63 — JULY 3rd

Twenty-eight members, representing nineteen affiliated societies, were present for this meeting organised and led by Mrs. Freda Kemsley, the Divisional Secretary for V.C. 63.

The weather was very hot and sunny. A variety of interesting habitats were examined: first an old ox bow, pools and water meadows immediately south of Fishlake and north of the Don; next an old ditch and hedgerows north of Fishlake (SE 66-15 and 67-15), and New Junction Canal by Skyehouse Bridge, east of the canal 64-17).

Members thought that the area had suffered less from the removal of hedges and ploughing-in than had Hatfield, and it was felt that local farmers and landowners should be alerted to the ecological importance of maintaining its unspoilt character.

After a picnic tea in the Village Hall, the President, Dr. J. D. Pickup, took the Chair at the meeting. Dr. L. Lloyd-Evans expressed a vote of thanks to local landowners who had permitted members to visit their land, and to Mrs. F. Kemsley, who had organised and led the day and had also, with Mr. Kemsley, provided the very welcome tea at the Village Hall.

Vascular Plants (D. R. Grant)

Fishlake is situated on the River Don in the alluvial plain of York. The district is an area of flat ground, only a few feet above sea level and it is frequently flooded in winter. There are a large number of dykes draining the very heavy clay soil. The area has many green lanes with mature hedgerows. A feature of the countryside is the pollarded White Willow *(Salix alba)* trees and the abundance of Hop *(Humulus lupulus)* climbing in the roadside hedgerows.

In the village centre Horseradish *(Armoracia rusticana)*, Aaron's Rod *(Verbascum thapsus)* and the grass *Apera spica-venti* were growing on waste ground. Members first examined old ox-bows and dykes by the side of the River Don where Hornwort *(Ceratophyllum demersum)*, Fine-leaved Water Dropwort *(Oenanthe aquatica)* and a rare Water Plantain *(Alisma lanceolata)* were found. A few plants of Pale Flax *(Linum bienne)* were found on the flood bank. Another ox-bow yielding Creeping Jenny *(Lysimachia nummularia)*, the Pondweeds, *Potamogeton natans* and *P. crispus*, and Ivy-leaved Duckweed *(Lemna trisulca)*.

After lunch, several of the members explored some of the green lanes and were shown the colony of the rare Fox Sedge *(Carex vulpina)*. Other interesting plants were Purple Smallreed *(Calamagrostis canescens)*, Pepper Saxifrage *(Silaum silaus)*, Teasel *(Dipsacus fullonum)* and Swinecress *(Coronopus didymus)*.

Finally the new Junction Canal at Sykehouse Bridge was examined for a short period during the very hot, sunny afternoon. The canal banks had Sweet Flag *(Acorus calamus)* and Gypsywort *(Lycopus europeaus)* and Hemlock Water Dropwort *(Oenanthe crocata)*, a rare plant in this part of Yorkshire, was discovered on the canal side. A dry bank alongside the canal had a fairly large colony of Dyer's Greenweed *(Genista tinctoria)* and under the small Hawthorn bushes there was a colony of Adder's Tongue Fern *(Ophioglossum vulgatum)*. By the side of the ditch there were several Common Spotted Orchis *(Dactylorchis fuchsii)* and a small stand of the Blunt Flowered Rush *(Juncus subnodulosus)*. Also in the area Mr. P. Skidmore collected Meadow Barley *(Hordeum secalinum)* — rare in this part of the county. Two other species known to occur locally, Stone Parsley *(Sison amonum)* and White Poplar *(Populus alba)*, were not seen on this excursion.

Mammals and other Vertebrates (C. Howes)
The unusually hot and, in places, parched conditions had driven even the most obtrusive mammals to cover; however glimpses of Rabbits, a Hare and a Woodmouse were obtained along the green lanes, where the smell of Foxes was often in the air. Shrews called from the thick hedgerows and rank herbage, mazes of Fieldvole runs were in the pasture and meadow land, and the odd old mole hill was evidence of past activity on the Don-side washland, now baked by the hot summer. Water Voles and signs of recent activity were seen on the numerous ponds, oxbows and networks of ditches throughout the district. Footprints showed that Rats had been prospecting amongst the strandline flotsam along the Don; they also occurred in the farm buildings and yards within Fishlake village.

Of the fish, a small Pike was seen amongst *Potamogeton* stems in the deep clear water of the Don oxbow at Fishlake, a site also known to hold Perch, Roach and Eel. Three-spined Sticklebacks were in large numbers in the deeper more open dykes, notably those which sluiced brackish, turbid water from the tidal Don, *c*.40 specimens of assorted sizes being caught in one net sweep at 44/663157. Specimens were also netted in the Don itself! Ten-spined sticklebacks abounded in most waters but were confined to shallower conditions with thick weed cover, such as the jungles of Elodea, *Elodea, Callitriche* and filamentous algae. Frogs were seen in dykes and dyke-side vegetation.

Insects (P. Skidmore)
Insects were present in quantity and many species were in great abundance. Amongst the more interesting species recorded by the river at Fishlake were the Hedge Brown butterfly *(Maniola tithonus)*, the ant *(Ponera punctatissima)* and the ground beetles *(Bembidion decorum* and *B. maritimum)*. Wherever *Salix alba* was noted to the north of Fishlake, the attractive Mirid bug *Sthenarus roseri* was swept in quantity.

An unusual report at the meeting was of two male Orange Tip butterflies *(Euchloë cardamines)* for the flight period of this insect should have been finished some weeks previously in view of the mild spring and hot sunny weather of June.

Ornithology (M. Limbert)
Fishlake stands just beyond the southern bank of the River Don, a pleasant village set amidst a rural landscape of fields, hedgerows, ponds and river floodbanks. A cross-section of all these areas was covered, and in addition Wormley Hill, the New Junction Canal at Sykehouse, and Southfield Reservoir were visited briefly.

The only bird of prey seen all day was a Kestrel. Post-breeding flocks of Lapwings were apparent, including 150 on flooded fields next to the reservoir. The autumn passage of Common Gulls commences in July in this area and three were seen. About 700 black-headed Gulls were in fields around the reservoir, and a Greenshank was in the area. The only other interesting wader noted was a Curlew near Wormley Hill — a breeding haunt. The reservoir itself was visited by two parties and yielded two Little Grebes, four Tufted Ducks, a Red-breasted Merganser, and single Black and Common Terns. Two Stock Doves were also noted. Excellent views were obtained of a Kingfisher near Fishlake as we walked along the Don floodbanks; nearby a Grasshopper Warbler was "reeling". At Sykehouse another interesting warbler was a Lesser Whitethroat.

Other species seen during the day were: Moorhen, Woodpigeon, Turtle Dove, Swift, Skylark, Swallow, House Martin, Carrion Crow, Magpie, Jay, Mistle Thrush, Song Thrush, Blackbird, Robin, Sedge Warbler, Whitethroat, Willow Warbler, Meadow Pipit, Pied Wagtail, Yellow Wagtail, Starling, Greenfinch, Goldfinch, Linnet, Redpoll, Yellow-hammer, Reed Bunting and House Sparrow. A total of 43 species was recorded during the day, which was one of unrelenting heat, with light ENE winds.

STAINFORTH, V.C. 64 — MAY 29th-31st
Stainforth, near Settle was the venue for the Spring Bank Holiday weekend and, although the rest of the county seemed to have had a very wet weekend, we had pleasant weather, with only one shower. On the Monday twelve members met for tea at the White Hart Hotel,

Giggleswick, and our President, Dr. J. D. Pickup, took the Chair at the meeting afterwards. Mr. John Flint expressed a vote of thanks to Mr. John Hickson, our Divisional Secretary for V.C. 64, for organising an excellent weekend and for leading our party on each day, and to the local landowners who had so kindly granted us access to their property.

Vascular Plants (J. R. Hickson)

On Saturday the woodland below Stainforth Scar was explored in some detail and the whole of the working day was spent here. There was no sign of recent human interference and only the lower edge of the wood had been grazed by sheep or cattle. As a result, many of the herbs, shrubs and trees usually associated with a good scar limestone wood were found to be present.

On the barer rocky outcrops bordering the pasture below the wood were typical associations of Ladies Mantle (mostly *Alchemilla vestita),* Parsley Piert *(Aphanes arvensis),* Thyme-leaved Sandwort *(Arenaria serpyllifolia),* Wall Speedwell *(Veronica arvensis),* Rue-leaved Saxifrage *(Saxifraga tridactylites),* Thale Cress *(Arabidopsis thaliana),* Wild Thyme *(Thymus serpyllum),* Biting Stonecrop *(Sedum acre),* Common Whitlow Grass *(Erophila verna)* and others. Around the edges of the wood and in the more open, rocky places Hairy Rock Cress *(Arabis hirsuta),* Shining Cranesbill *(Geranium lucidum),* Small Scabious *(Scabiosa columbaria),* Salad Burnet *(Poterium sanguisorba),* and Burnet Saxifrage *(Pimpinella saxifraga),* were all fairly frequent, whilst Field Garlic *(Allium oleraceum),* occurred plentifully on the village side of the wood.

Inside the wood occasional patches of Mossy Saxifrage *(Saxifraga hypnoides),* Goldilocks *(Ranunculus auricomus),* Common Scurvy Grass *(Cochlearia officinalis),* Hairy St. John's Wort *(Hypericum hirsutum),* Wild Basil *(Clinopodium vulgare),* Lily of the Valley *(Convallaria majalis),* Common Rock Rose *(Helianthemum chamaecistus),* Wood Cranesbill *(Geranium sylvaticum),* Hairy Violet *(Viola hirta),* Welsh Poppy *(Meconopsis cambrica),* Marjoram *(Origanum vulgare),* and Woodruff *(Asperula odorata),* were to be seen and occasional plants of Giant Bellflower *(Campanula latifolia),* False Oxlip *(Primula veris x P. vulgaris),* and Melancholy Thistle *(Cirsium heterophyllum).*

Shrubs included Buckthorn *(Rhamnus cathartica),* Spindle *(Euonymus europaeus),* Black Dogwood *(Frangula alnus)* and various roses, notably *Rosa villosa* and *R. coriifolia.* Among the smaller trees were Bird Cherry *(Prunus padus),* and Whitebeam *(Sorbus aria,* probably *x S. intermedia).*

Sunday was spent amongst the open pastures and scars between Little Stainforth and Feizor, in grid square SD 86 tetrad D and produced several additions to the species seen the previous day. A nice plant of Butcher's Broom *(Ruscus aculeatus),* was inspected near one of the barns and in the same lane, a few plants of Good King Henry *(Chenopodium bonus-henricus)* were noted.

As expected, the grassland was adorned, in places, with the yellow-flowered Mountain Pansy *(Viola lutea)* and occasionally with Mountain Everlasting *(Antennaria dioica).* The Lesser Meadow Rue *(Thalictrum minus)* was fairly common in the limestone pavement areas and on the rocky scars. On the top of Smearsett Scar a few plants of Rigid Buckler Fern *(Dryopteris villarsii)* and Limestone Fern *(Thelypteris robertiana)* were to be seen in the grikes, and on the face of the Scar a few pockets of Bloody Cranesbill *(Geranium sanguineum)* and Angular Solomon's Seal *(Polygonatum odoratum).*

Horseshoe Vetch *(Hippocrepis comosa),* occurred both here and in several other places in the area. A few plants of what were taken to be Alpine Cinquefoil *(Potentilla crantzii),* were noted at the top of one low scar and quite a number of what were thought to be Spring Cinquefoil *(Potentilla tabernaemontani)* were observed on some stony knolls nearer to Stainforth Lane.

On Monday, the party was again in tetrad I, as on the Saturday, and by covering considerably more ground, added many more species to those seen earlier. These included Early Purple Orchid *(Orchis mascula),* Globeflower *(Trollius europaeus),* and Small-leaved Cotoneaster *(Cotoneaster microphylla)* at the top of Stainforth Scar, together with Horseshoe

Vetch *(Hippocrepis comosa)* and Alpine and Spring Cinquefoil *(Potentilla crantzii* and *P. tabernaemontani)* again. Between Upper Winskill and Catrigg Force, Mountain Everlasting *(Antennaria dioica)* was again noticed in the grassland and Spring Sandwort *(Minuartia verna),* occurred on some bare patches. Monkeyflower *(Mimulus guttatus),* and Scurvy Grass *(Cochlearia officinalis),* were two members of a rather poor flora by the beck above the Force and the woodland below, although very luxuriant in places, it was not found to be very rich in species. Lower down the beck, towards Stainforth, some nice calcareous flushes produced an abundance of Bird's Eye Primrose *(Primula farinosa),* with *Carex lepidocarpa* and *C. hostiana.* On entering the village, the eye was attracted to the flowers of *Erinus alpinus* (Fairy Foxglove) on garden walls on both sides of the lane.

No doubt due to the fact that the 10km. square visited contains so many outstanding sites, virtually no new records were added for SD 86 during the three days. Perhaps the most notable species without a recent record was Spindle *(Euonymus europaeus),* seen on the Saturday near the top of Scar Wood.

Mammals and Lower Vertebrates (W. A. Ely)
Common Frog occurred on Smearsett, with Brown Hare and Mole. Hills of the latter were also found at Taitland, and there were Rabbits along the Cartrigg Beck.

Insects (W. A. Ely)
The cold, wet weather on Saturday and Sunday was unsuitable for flying insects so most effort was directed at the ground beetles. Few species, all common, were found and included *Abax parallelopipedus* P. & M., *Pterostichus nigrita* Paykull, *Pt. melanarius* Ill., *Pt. strenuus* Pz., *Clivina fossor* L., *Loricera pilicornis* Fab and *Badister bipustulatus* Fab.

Monday provided far better weather and therefore more insects. The woods at Taitland contained a few hoverflies and scorpionflies while above them were small numbers of beetles and bumblebees. The valley of the Cartrigg Beck was the richest area and yielded such typical ground-beetles as *Nebria gyllenhali* Schön and *Agonum albipes* Fab. A queen tree wasp *(Vespula sylvestris* (Scop.)) was found here and the valley sides contained immature grasshoppers and groundhoppers.

Ornithology (J. D. Pickup)
During the weekend the area to the east of Stainforth village was visited. 40 species were recorded, all birds expected on the limestone hills and streams. Three species of Wagtail, Yellow, Grey and Pied were seen near Catrigg. Juvenile Dippers gave evidence of successful breeding and Lapwings, Curlews, Redshank and Common Sandpipers obviously had young broods. On Sunday, 30th May 1976, one member described an unusually large greyish Pipit but there was insufficient confirmation to give a specific label to this bird. Spotted Flycatchers were feeding near the river above Stainforth.

ARKENGARTHDALE AND REETH, V.C. 65 — JULY 17th-18th

We again had magnificent weather for the last meeting this summer at Arkengarthdale and Reeth, near Richmond. This was a joint meeting with the Conchological Society of Great Britain, and we were delighted to have so many of their members joining our party of twenty-four over the two days.

On the first day we walked in two parts of the Arkle valley, between Reeth and Arkletown and some climbed to the limestone scars and peaty moorlands above. The next day we explored the banks of the Swale from Reeth to Healaugh, gathering for the tea and meeting at the Black Bull Hotel, Reeth. Our President, Dr. J. D. Pickup, took the Chair at the meeting afterwards. Miss H. Lefèvre gave a vote of thanks to the local landowners who had generously granted us access to their properties, to Mrs. Jean Holloway, our Divisional Secretary for V.C. 65, who had organised the two days and to Mr. Leak of the Darlington Society, who had also acted as a guide on the first day.

Flowering Plants (Mrs. D. Haythornthwaite)

The first day was spent on the edge of moorland and the banks of the River Arkle between Reeth and Arkle Town; an interesting area of both limestone and acid conditions. Considering the dryness of the season, a very good total of species (250 on the first day) were found in a restricted area; perhaps the most interesting feature was the number of plants (i.e. 56) NOT recorded in the *Atlas of the British Flora*.

On the second day the party covered a riverside path from Reeth to Healaugh, also going down the South side of the River Swale from the footbridge as far as Grinton. This square has been better worked and only 20 plants were added to the master card. Again we had a good variety of plants and grasses although one or two seemingly obvious ones were absent. *Epilobium nerterioides* (New Zealand Willowherb) and *Veronica filiformis* seem to have spread into every dale in the North Riding.

A short list of the more interesting plants found is as follows: *Anthylis vulneraria, Campanula latifolia* (common in the area), *Montia sibirica, Eleocharis quinqueflora, Equisetum telmateia, E. pratense, Lysimachia nemorum, Rorippa sylvestris, Solidago virgaurea, Taxus baccata, Fragaria vesca* and *Minaurtia verna*. I am indebted to the following for help with records: Mrs. A. C. M. Duncan, Mr. J. Hickson, Miss. H. Lefèvre, Mrs. Holloway and Mr. R. Smith.

Plant Galls (F. B. Stubbs)

During the two days, 27 different plant galls were seen, the majority being present in both of the areas visited. Of the 12 galls caused by mites, those on leaves were widespread, but the big-buds of *Eriophyes avellanae* on Hazel and *E. rudis* on Birch were both very scarce. The grey terminal gall of *E. thomasi* on Thyme was found in one site. Gall midges *(Cecidomyidae)* accounted for eight examples, other insect agents being of the Hymenoptera and Hemiptera. No fungal galls were noted, apart from one specimen of the Alder Root Nodule, whose origin is not fully explained. The virtual absence of Oak trees reduced the tally of gall wasps *(Cynipidae)* which can be expected in many areas.

Bryology (M. Dalby)

Habitats ranging from open acid moorland to limestone crags and from the boulders of Arkle Beck to acid woodland made the Saturday meeting full of variety. All areas were very dry and most of the sphagna were dried up, but *S. robustum* and *S. girgensohnii* were among the seven species found. The occasional more basic flush on the moorland produced *Cratoneuron commutatum, Chiloscyphus pallescens, Philonotis calcarea, Climacium dendroides* and *Sphagnum squarrosum*. On the limestone cliffs and screes grew the typical species including *Neckera crispa, Scapania aspera, Tortella tortuosa* and *Rhytidiadelphus triquetrus*.

The boulders of Arkle Beck produced abundant *Eurhynchium riparioides,* with *Cinclidotus fontinaloides, Hygrohypnum ochraceum* and richly fruiting *Drepanocladus uncinatus* and the trees beside the stream were rich in such species as *Tortula latifolia, Leskea polycarpa, Bryum capillare, Dicranoweissia cirrata* and many others. In the scrub woodland near the ponds grew *Hylocomium splendens, Pleurozium schreberi, Plagiothecium undulatum* and *Orthodontium lineare* with *Acrocladium cuspidatum, Bryum pseudotriquetrum* and *Cratoneuron filicinum* along the edge of the water.

Insects (J. H. Flint)

Two excellent days for collecting and a keen party of entomologists produced a goodly number of local and uncommon forms from several orders. On Saturday below Arkle town the dragonfly *Aeshna juncea* L. was swept from vegetation where it was resting while the sun was obscured, as we descended to the valley. Most work was then concentrated beside the Arkle Beck. Here a sandy stretch among the riverside shingle produced a strong colony of the tiny click-beetle *Hypnoidus dermestoides* Hbst. and single specimens of the weevil

Otiorrhynchus rugosostriatus Goez. and the very rare *Dryops nitidulus* Heer. Mr. K. G. Payne beat the pine-cone bug *Gastrodes grossipes* Deg. from larch which also yielded *Dromius quadrinotatus* Pz. (K.G.P.) and the bugs *Acompocoris alpinus* Reut. and *Tetraphleps bicuspis* H.-S. (A. Norris). Two tiny lace-bugs, *Acalypta parvula* Fall. and *A. carinata* Pz. were also taken here (A.N.) while Dr. L. Lloyd Evans found *Chartoscirta cocksii* Curt. on the hillside above.

Sunday was spent by the Swale. Here were strong colonies of the water-cricket *Velia saulii* Tam., each with several of the usually rare macropters (L. Ll.E.). Riverside insects included the beetle *Bembidion prasinum* Duft., the river whirligig *Orectochilus villosus* Muell. (A.N.) and several *Elmis aenea* Muell. and *Latelmis volckmari* Pz. which had emerged from the water and were swept from vegetation or seen on the stones in the hot sunshine. Strong colonies of solitary bees *(Halictus* spp.), their parasites *(Sphecodes* spp.) and solitary wasps *(Crossocerus varius* Lep. and others) were found in vertical exposures of sandy soil on the river bank while *Crossocerus dimidiatus* F. was taken (Mrs. H. E. Flint) hunting over the leaves of the butterbur in a corner sheltered from the wind. One of the more remarkable beetles taken here (K.G.P.) was the tiny anobiid beetle *Dryophilus pusillus* Gyll., usually associated with conifers. *Tinicephalus hortulanus* M.D. was found (A.N.) on rockrose.

There was an enormous abundance of ladybirds, chiefly *Coccinella 7-punctata* L. and to a lesser extent *C. ll-punctata* L., probably the result of two successive hot summers and a mild, dry winter. Bumble-bees also were plentiful and A.N. listed *Bombus terrestris* L., *B. lucorum* L., *B. hortorum* L., *B. agrorum* F., *B. muscorum* L., *B. lapidarius* L. and *B. ruderarius* Muell. while K.G.P. had the parasitic beetle *Antherophagus pallens* Ol. which is sometimes found hanging from the bee's tongue.

Twenty-one species of ground beetle were noted in connection with the 10 km. mapping scheme, including the very rare *Notiophilus aestuans* Mots. which was the only beetle found on the old lead mine workings on Harkerside Moor, which the severe drought conditions rendered unprofitable for insect collecting.

Lepidoptera (Mrs. J. Payne)

Thirty-four species were recorded, eleven from a light trap. The following butterflies were seen or taken: Meadow Brown *(Epinephele ianira)*, the Small Heath *(Coenonympha pamphilus)*, Large White *(Pieris brassicae)*, Small White *(Pieris rapae)*, Green-veined White *(Pieris napi)*, Common Blue *(Polyommatus icarus)*, Small Tortoiseshell *(Vanessa urticae)*, Red Admiral *(Pyrameis atalanta)* and Peacock *(Vanessa io)*.

Moths included the Gold Spangle *(Plusia bractea)*, the Barred Yellow *(Cidaria fulvata)*, the Barred Straw *(Lygris pyraliata)* and the Double Striped Pug *(Gymnoscelis pumilata)*.

Larvae of the Foxglove Pug *(Eupithecia pulchellata)* were noted in the flowers of Foxglove. The Small Ermine was taken as larvae in webs on Bird Cherry and also, by beating, as the imago.

Conchology (A. Norris)

The combined billing of this meeting with the Conchological Society of Great Britain and Ireland, the Yorkshire Conchological Society and the Yorkshire Naturalists' Union produced a total of 16 conchologists and their friends for part or the whole of the two-day meeting. Two 10 km. squares were examined SE 44/0—9—, Lower Arkengarthdale and NZ 45/0—0—, Upper Arkengarthdale. 43 species were recorded in the lower and 43 in the upper part of the Dale, with a combined total of some 50 species. The most important records were as follows: a few examples of the very local snail 'in the Yorkshire area' *Helicella itala* (L.), were found near the scar above Reeth; *Clausilia dubia* Drap. and *Ashfordia granulata* (Alder) proved difficult to find, but specimens were found in Barney Beck, Healaugh, near Reeth; the very local slug *Deroceras agreste* (L.) was found both on the grassland below the Scar and in Barney Beck, extending the known distribution of this species in Yorkshire.

LIST OF SPECIES RECORDED — A and B = 45/0—0— and 44/0—9— respectively.

Acicula fusca (Mont.)	A		*Vitrina pellucida* (Mull.)	A	B
Carychium minimum Muller	A	B	*Vitrea crystallina* (Mull.)	A	B
C. tridentatum (Risso)	A	B	*V. contracta* (West)	A	B
Succinea putris (L.)		B	*Nesovitrea hammonis* (Strom.)	A	B
Oxyloma pfeifferi (Rossm.)	A		*Aegopinella pura* (Alder)		B
Cochlicopa lubrica (Muller)	A	B	*A. nitidula* (Drap.)	A	B
C. lubricella (Porro)	A	B	*Oxychilus cellarius* (Muller)	A	B
Pyramidula rupestris (Drap.)	A	B	*O. alliarius* (Miller)	A	B
Columella aspera Walden	A		*Limax maximus* L.		B
Vertigo pygmaea (Drap.)	A	B	*L. marginatus* Muller	A	B
Lauria cylindracea (Da Costa)	A	B	*Deroceras laeve* (Muller)	A	
Vallonia excentrica Sterki	A	B	*D. agreste* (L.)	A	B
Ena obscura (Mull.)	A	B	*D. reticulatum* (Mull.)	A	B
Punctum pygmaeum (Drap.)	A	B	*Euconulus fulvus* (Mull.)	A	B
Discus rotundatus (Mull.)	A	B	*Cochlodina laminata* (Mont.)	A	B
Arion ater (L.)	A	B	*Clausilia bidentata* (Strom)	A	B
A. circumscriptus Johnston	A	B	*C. dubia* Drap.		B
A. fasciatus (Nilsson)	A		*Balea perversa* (L.)	A	B
A. hortensis Fer	A	B	*Helicella itala* (L.)	A	
A. intermedius Normand	A	B	*Ashfordia granulata* (Alder)	A	B
Trichia striolata (C.Pfe.)	A	B	*Potamopyrgus jenkinsi* (E. A. Smith)		B
T. plebeia (Drap.)	A		*Lymnaea truncatula* (Mull.)	A	B
T. hispida (L.)	A	B	*L. peregra* (Mull.)		B
Arianta arbustorum (L.)		B	*Ancylus fluviatilis* Mull.	A	B
Cepaea hortensis (Mull.)	A	B	*Pisidium personatum* Malm.	A	B

Ornithology (G. E. Alderson)

On the Saturday, the Arkle Beck above Reeth and the adjoining Scars and moorland were covered. Birds seen along the beck and its associated trees were Pheasant, Carrion Crow, Rook, Jackdaw, Magpie, Great Tit, Blue Tit, Long Tailed Tit, Treecreeper, Nuthatch, Wren, Robin, Songthrush, Willow Warbler, Spotted Flycatcher, Dunnock, Meadow Pipit, Tree Pipit, Skylark, Pied and Yellow Wagtails, Starling, Greenfinch, Goldfinch, Linnet, Redpoll, Chaffinch, House Sparrow, Tree Sparrow, Swift, Swallow, with Ring Ouzel on the Scar slopes and Kestrel hovering. A pair of Partridges with a brood of eight were near the road. On the moorland were Golden Plover, Red Grouse, Redshank, Snipe, Curlew and Merlin.

On the Sunday we visited the River Swale between Reeth and Healaugh. A Tawny Owl flew from a riverside Alder and a Sparrowhawk, Wood Pigeon and Stock Dove were seen. Dipper, Sandpiper, Moorhen and Mallard were on the river, and a Heron flew down it. On one riverside pasture were more than three hundred Lapwings. Many of the birds seen along the Arkle were also recorded beside the Swale. Black Headed Gull, the Lesser Black-backed Gull and Sandmartins flew overhead and a Goosander was on the Swale. The two fine, sunny days produced a total of sixty-one species.

FIELD NOTES

Melanistic Shield Bug

At Cayton Bay, Scarborough on 6th May 1976, the gorse bushes contained large numbers of the Gorse Shield Bug, *Piezodorus lituratus* (Fab.). Amongst the many normal specimens a melanistic female was collected. The head, body, fore-wings, femora and tibiae were black, while the tarsi and the last three antennal segments were dark rufous-brown.

William A. Ely

Notes on Suburban Hedgehogs

An analysis of records on file with the Y.N.U. and at Doncaster Museum indicates that the hedgehog (*Erinaceous europaeus* L.) in South Yorkshire is predominantly a suburban specialist inhabiting gardens, allotments, municipal parks, etc. Impressions of distribution based on road casualty records reveal a distinct 'hedgehog zone' around the outskirts of urban areas and the commuter dormitory districts. In rural, particularly arable areas, records are far less frequent, occurrences indicated by road casualties showing them to be restricted to villages or to isolated farms or other dwellings — a feature noted for the Scarborough district by Massey (*Nat.* 1972: 103-105).

To date it has not been satisfactorily demonstrated why hedgehogs should exhibit this apparently synanthropic tendency. The availability of daytime and breeding retreats and hibernacula in the form of garage and garden shed foundations, compost heaps, rockeries, shrubberies, herbaceous borders etc., artificial feeding and often taming by people putting out bread and milk and bird table scraps; and å possible concentration of invertebrate food (garden pests) may be features of the suburban attraction. Herter (*Hedgehogs*, 1965, Phoenix Press) however suggests that high urban populations may be accounted for by escaped or released pets and animals introduced for pest control purposes. Whatever the reason the advantages of the suburban habitat evidently outweigh the increased hazard of busier roads. Also the widespread practice of grubbing out hedgerows, 'thicks' and 'roughs' together with intensive arable farming practices has contributed to making the countryside relatively less hospitable.

Synanthropy in hedgehogs may have ancient origins, skeletal remains having been found in various archaeological sites, Yorkshire examples being a 7th century specimen from the Anglian Tower site in York (Bramwell, D. *in* Radley, J., 1972, *Yorks. Archaeol. J.* 44: 38-64) and a 15th century specimen from a moat at East Cowick 44/6520 det. C.A.H. (Doncaster Museum/Department of the Environment excavation, 1976). Alternatively this may be evidence of hedgehogs having long been regarded as gastronomic delicacies, a tradition still surviving with gypsies around Doncaster.

From observations of hedgehogs in urban areas, animals seem to adhere to a regular timetable of foraging activities, appearing in certain gardens at approximately the same time each evening. Animals also appear to circulate through an area along well used routes, tracks being particularly obvious amongst mat-forming rockery plants eg. *Aubretia* and around ponds or other drinking sites.

The analysis of hedgehog droppings collected from 12th July to 14th September 1976 from a garden at Sprotborough, Doncaster 44/5603, failed to detect conclusive evidence of feeding on kitchen scraps, probably through such food leaving few identifiable traces after being digested. The presence of tomato seeds in one dropping gave the only suggestion of scavenging. However as eight of the thirteen droppings were collected from an area where kitchen scraps are often placed, it would seem that regular scavenging may take place.

The droppings, from 2.5 cm to 5 cm in length and from 1 cm to 1.5 cm in diameter were dark brown to black in colour, fairly dry and consisted of well masticated invertebrate exoskeletons together with fragments of mosses and grasses, no doubt taken inadvertently while catching and eating prey. Of the three droppings analysed in detail, the first contained the remains of the carabid beetles *Pterosticus vulgaris* (Schaum), *P. madida* (Fab.) and *Amara familiaris* (Duft.), a weevil (curculonidae), 32 earwigs *Forficula auricularia* L. of both sexes and assorted sizes (numbers calculated from pincers retrieved) and two centipedes of the genus *Lithobius*, probably *L. forficatus* L. The second contained remains of eight earwigs, the small black and yellow ladybird *Progylea 14-punctata* (L) and the two *Pterosticus* species which also occurred in the third dropping together with fifteen earwigs, the seven spot ladybird *Coccinella 7-punctata* (L)., a bumble bee, probably a *Bombus* sp., and some tomato pips.

As coccinellid beetles derive protection foom predators through being unpalatable it is interesting that two species of ladybirds had been taken, demonstrating the hedgehog's capability of taking noxious substances. Herter *(loc. cit.)* notes animals feeding with no ill effects on poisonous oil beetles *(Melöe)* and the 'Spanish Fly' *Lytta vesicatoria* (L). In

captivity hedgehogs have eaten a wide variety of both animal and vegetable material. A specimen which over wintered without hibernating at Doncaster Museum consumed the bodies of a range of birds, mammals and fish brought in for skinning (*Nat*. 1965: 11).

With droppings having poor moisture retention properties they provide an unsuitable substrate for dung-feeding larvae, however the fly *Paregle radicata* (L) was reared from the larval stage from a dropping collected on 22nd July and kept in a sealed polythene bag, the fly emerging on 17th August.

Thanks are due to P. Skidmore for much help with identifications.

C. A. Howes

Mammal and Lower Vertebrate Section: Excursion to Derwent Edge and Howden Moors, 7th March 1976

Sorby Natural History Society, Sheffield were hosts to both the Y.N.U. and the Mammal Society for the fifth annual "Mountain Hare Watch", led by Dr. Colin Marsden. 60 members attended, including a party from Luton, Bedfordshire, who brought with them a captive specimen of the Edible Dormouse (*Glis glis* Linn.), their local speciality.

The meeting set off on foot from Cutthroat Bridge, Derbyshire on a day of sunshine with intermittent snow showers in a biting easterly wind. Around lunchtime some enthusiasts remained on the scarp slope under Dovestone Tor to photograph hares and tape record Red Grouse. The remainder crossed over the border into Yorkshire and walked the 18 miles to Smallfield by way of Back Tor, Margery Hill, and Outer Edge, plotting sightings of Mountain Hares on a 2½″ map. The highlight of the day was a pair seen in a characteristic "boxing match" which unfortunately only lasted a few seconds. In all, 84 hares were seen in pure white or 'piebald' pellage, many sheltering from the wind on the western facing slopes or in peat hollows. Droppings of Fox were also very common, and samples collected and analysed by Colin Howes show that the Mountain Hare is an important source of food to the moorland Fox.

Derek Whiteley

A Redshank as Predator on Redwings

Almost every school day between 4th December and 19th December 1975, and on odd days in January 1976, a Redshank, *Tringa totanus*, was observed chasing Redwings, *Turdus musicus*, to make them drop their food, on Thorngumbald County Primary School playing fields. The school is situated in North Humberside beside the main road between Hull and Withernsea.

The Redshank would walk around, feeding for itself as it went. Suddenly it would fly very low, directly at a Redwing. The startled Redwing would fly a short distance leaving or dropping food which the Redshank would retrieve. We assumed it was always the same Redshank as it carried a ring. Its behaviour was so predictable and frequent that we were able to show it to over 100 children in small groups from a classroom window over a number of days.

At the time there were usually some 20 Redwings and perhaps 10 Fieldfares, *Turdus pilaris*, feeding on the field. The Resdhank was never seen chasing a Fieldfare. On one dramatic occasion the Redshank had just seized some food left by a surprised Redwing when a Common Gull, *Larus canus*, flew at the Redshank and scored an equal success!

H. M. Frost

Bryological Section Meeting at Hazel Head

The spring meeting of the bryological section was held at Hazel Head, near Penistone (V.C. 63) on 24th April, 1976. The six members spent an enjoyable day within the kilometre square 44/2002 along the banks of the River don and on rough pasture and moorland south of the railway.

The R. Don was considerably polluted and only a limited number of species were found on the boulders, *Fontinalis squamosa*, *Hygrohypnum luridum* and *Scapania undulata*, but on the shaley outcrops along the bank were rich growths of *Pellia epiphylla*, *Pohlia annotina*, *Polytrichum aloides* and a little *Solenostoma sphaerocarpum*. Peaty banks produced *Diplophyllum albicans*, *Pohlia nutans*, *Calypogeia muellerana*, *Isopterygium elegans*, *Cephalozia bicuspidata*, *Lepidozia reptans* and a small colony of *Leptodontium flexifolium*. The trees had few epiphytes, most growth being round the boles, *Orthodontium linearo*, *Dicranoweissia cirrata* and *Lophocolea cuspidata* were noted. *Dicranella squarrosa* was seen in a boggy area.

The rough pasture examined in the afternoon produced six species of sphagna, *S. palustre*, *S. papillosum*, *S. recurvum*, *S. cuspidatum*, *S. fimbriatum* and *S. plumulosum* growing with *Acrocladium stramineum*, *Drepanocladus fluitans*, *Calypogeia fissa*, *Gymnocolea inflata*, *Polytrichum commune* and *Brachythecium rivulare*. *Splachnum ampullaceum* was found on dung and in one small area *Aulacomnium palustre*, *Acrocladium giganteum*, A. *cuspidatum* and *Mnium seligeri* were growing. On boulders in the small streams running down to the river were found *Fontinalis antipyretica*, *Rhacomitrium aciculare*, *Hyocomium flagellare*, *Eurhynchium ripiarioides* and *Atrichum crispum*. Near rocky outcrops on the higher slopes grew *Barbiliphozia floerkii*, *B. attenuata*, *Campylopus flexuosus*, *C. pyriformis*, *Polytrichum piliferum* and *Dicranum scoparium*.

Few records exist for this area so additional species are listed: *Dicranella heteromalla*, *Plagiothecium denticulatum*, *Bryum caespiticium*, *Mnium hornum*, *M. punctatum*, *Brachythecium rutabulum*, *Eurhynchium praelongum*, *Camtothecium sericeum*, *Ceratodon purpureus*, *Atrichum undulatum*, *Fissidens taxifolius* and *Totula muralis*, and *Barbula tophacea* from the railway bridge.

M. Dalby.

Spring Fungus Foray: Ingleton, 7-10th May 1976

A dozen members and friends stayed for varying periods during the foray, and to those who travelled from afar our thanks are due for their attendance and reports. The following are the more noteworthy finds (F — Feizor; C — Clapham; K — Kingsdale; L — Lenny Woods; I — Ingleton village):

Ascomycetes:
- Discomycetes:
  - *Arachnopeziza aurata* C, F — one previous record
  - *Colpoma quercinum* C
  - *Peziza fimeti* F
  - *Pyrenopeziza petiolaris* C, L — on *Acer* petioles; few records and apparently scarce
- Pyrenomycetes:
  - *Diaporthe decedens* K — on *Corylus*
  - *Diatrypella nigro-annulata* C — on *Fagus*
  - *Eutype flavo-virens* C — on *Fagus*
  - *Pseudonectria rousseliana* — on *Buxus*

Basiodiomycetes:
- Gasteromycetales:
  - *Lycoperdon candidum* F — old specimens
- Uredinales:
  - *Kuehneola uredinis* (I) I, *Puccinia buxi* (III) C — both on same bushes as at autumn foray 1975; in each case neighbouring bushes appeared to be free from infection

Fungi imperfecti:
- *Brachysporium masonii* F

W. G. Bramley

Euphrasia salisburgensis **in Yorkshire: A Correction**

In my note in *The Naturalist* (1976: 75) on *Euphrasia salisburgensis*, the sentence on lines 9-11 should read (dropped clause in italics) as follows: "Of these, 33 are deleted with the names or initials of donors following the deletions *in 28 cases* and in two instances the date of acquisition in 1909 is given."

W. A. S.

BOOK REVIEWS

Flora Europaea: Vol. 4, Plantaginaceae to Compositae (and Rublaceae) edited by **T. G. Tutin, V. H. Heywood, N. A. Burges, D. M. Moore, D. H. Valentine, S. M. Walters** and **D. A. Webb.** Pp. xxxx + 505, with five maps. Cambridge University Press, 1976. £25.00.

This volume completes the account of the Dicotyledonous families. Three-quarters of its contents are devoted to the Compositae in which 181 genera are recognised. The largest genera covered with the number of species in each are: *Hieracium* 260, *Centaurea* 221, *Galium* 145, *Campanula* 144, *Crepis* 70, *Senecio* 67, *Asperula* 66, *Anthemis* 62, *Cirsium* 60, *Artemisia* 57 and *Achillea* 52.

Perhaps the most formidable problems to arise in the preparation of this volume concerned the treatment of the genera *Centaurea*, *Taraxacum* and *Hieracium*. In the first of these 221 species are recognised (the highest number yet in any non-apomictic genus) and many of these species embrace large numbers — sometimes up to a score — of subspecies. In *Taraxacum* 30 groups are keyed out and descriptions given of the group characters. Species referred to these groups are listed together with their countries of occurrence but without individual descriptions. The *T. officinale* group alone includes over 100 species. A somewhat similar treatment is accorded to *Hieracium*. The account of this distressing genus in which, more than in any other, speciation has been afflicted by chronic elephantiasis runs to over 50 pages and upwards of 2,400 names are listed in the index.

In this as in the preceding volumes the treatment of some genera and aggregate species is provisional since present knowledge is often inadequate for a proper evaluation of all described taxa and only long-term field observations or experimental work will resolve some of these problems. But one could reasonably expect an answer to problems solvable by reference to type specimens. The identities of *Carduus crispus* and *C. acanthoides* have long been sources of confusion. According to Linnaeus (*Sp. Pl.* 821: 1753) the latter "differt a *C. crispo* calycibus solitariis villosis". In this account *C. crispus* can only be reached in the key by taking the route "Stem glabrous or subglabrous" whilst *C. acanthoides* is reached under the heading "Stem arachnoid - hairy to tomentose"; yet this is contradicted in the text where the descriptions of both species employ precisely the same words — "Stem sparsely arachnoid hairy". *C. crispus* is here said to occur in France, Belgium and Holland but *not* in the British Isles, which is geographically improbable and is belied by the fact that many plants in this country fit the description given. It is moreover stated that *C. crispus* subsp. *crispus* occurs in "C.E. & S. Europe", a distribution impossible to reconcile with Linnaeus' own statement "in Europaea septentrionalioris agris cultis". Nor is it understandable why these two taxa, which are certainly very closely allied if indeed they are specifically distinct should become well separated in the species sequence with such a widely different and unrelated species as *C. personata* placed between them. By contrast, in the genus *Cirsium* no attempt is made to subdivide *C. arvense* although *C. setosum* and *C. incanum* have claims for recognition at least as strong as those of the two *Carduus* species and are phenotypically more strikingly different.

In this volume as in earlier ones a considerable number of British species appear under unfamiliar names. This is often due to changes of opinions as to generic boundaries. Only *Gnaphalium luteo-album* and *G. undulatum* are retained in that genus, the rest are transferred to the genera *Filaginella* and *Omalotheca*. The erstwhile *Filago minima* and *F. gallica* are transferred to *Logfia* and the remaining three British species of *Filago* all appear

with changed specific epithets. *Matricaria* and *Tripleurospermum* as construed in recent British floras are replaced by *Chamomilla* and *Matricaria* respectively, the common Scentless Mayweed being called *M. perforata* Mérat with *M. maritima* L. being adopted for the biennial or perennial Mayweed of shingle beaches and coastal habitats. The delimitation of such genera is largely a matter of personal opinion and as such is subject to periodic reappraisals. To botanists brought up on Bentham and Hooker, the Tansy and Goldilocks were known as *Tanacetum vulgare* and *Aster linosyris*; but Clapham, Tutin and Warburg, and Dandy taught us to eschew these names in favour of *Chrysanthemum vulgare* and *Crinitaria linosyris*. Now the names revert once more to *Tanacetum vulgare* and *Aster linosyris*. Nomenclatural and taxonomic changes in the other families covered in this volume include *Galium album* Miller for *G. erectum* Huds., and *G. elongatum* Presl which has usually been treated in this country as a subordinate taxon under *G. palustre*, is given specific rank. The Limestone Bedstraws *G. sterneri* and *G. pumilum* are joined by a third species *G. fleurotii* Jord. apparently confined to Southern England and Central France.

The usefulness of this volume and its high quality of production match those of its predecessors; but it is a measure of inflation and escalating costs that its price exceeds that of the first three volumes combined. The concluding volume seems likely to be beyond the reach of all private owners save the very well-off.

W.A.S.

Trees and Bushes of Europe by **Oleg Polunin**, with drawings by **Barbara Everard.** Pp. xvi + 208, with over 100 illustrations in colour. Oxford University Press. 1976. £5.25

The growth of the package holiday abroad in recent years has broadened the vistas of many botanists. This has no doubt stimulated the production of a variety of guides to the identification of the European flora. The more outstanding of these have been published by the Oxford University Press where emphasis has been paid to the identification of plants mainly through coloured photographs and drawings. The work under review is no exception: it provides a wealth of illustrations complemented by identification keys, and a concise but informative text with an easy-to-follow symbol coding to leaf form and geographical distribution in Europe.

The photographic plates and drawings pay attention to habit, leaf shape, flowers, fruits, etc. Only in a few instances is there duplication, where a clearer photograph would have rendered the drawing unnecessary and vice versa. Two sections on the recognition of tree barks and the use to man of selected trees and bushes (especially in landscape practices) are particularly interesting features. This attractive and useful publication is thoroughly recommended.

M.R.D.S.

The Natural History of Trees by **Herbert L. Edlin.** Pp. xvi + 269, with 28 pp. of monochrome plates and 23 line drawings. Weidenfeld & Nicolson, London. 1976. £10.00

Herbert Edlin has produced a book which, in a simple and readable style, takes the reader by the hand from seedling to sawlog explaining the biology and ecology of trees, the geographical distribution of forest types to be found round the world, and finishing with an account of how trees are used by man. The approach is that of a traditional forester who views with suspicion such management aids as economic analysis and for whom nothing can substitute for the interest and knowledge of an experienced and dedicated forester. For this kind of book he is probably right. This is an excellent book for the beginner, or the tree lover who wants to improve his background knowledge and understanding. The only disappointment is that this pleasantly produced book is rather sparsely illustrated with monochrome photographs and a few line drawings.

R.L-S.

Responses of Plants to Air Pollution edited by **J. B. Mudd** and **T. T. Kozlowski.** Pp. xiv + 383, with numerous black and white photographs and line drawings. Academic Press, New York. 1975. $29.50

This book provides a reasonably comprehensive account of the responses of plants to many of the major air pollutants such as sulphur dioxide, fluorides, ozone, peroxyacyl nitrates, oxides of nitrogen, and particulates, but scant attention has been given to the effects of acid precipitation, heavy metals, radio-isotopes and ethylene.

The book will be useful to those who require an introduction to the literature (mainly American) of this subject, rather than to those in need of more discussion of principles, evidence to support the authors' generalisations, and information on the eco-physiological status of the plant when exposed to air pollution.

Specific topics dealt with include: plant responses to mixtures of pollutants; effects on ultra-structure, forests, and bryophytes and lichens; interactions with vegetation canopies, plant disease, and agricultural practices. Some of the chapters are essentially biochemical, but much of the book contains valuable information for the biologist with a general interest in air poliution.

M.R.D.S.

Moths in Colour by **Leif Lyneborg.** Pp. 177, with 43 coloured plates by Niels Johnsson; edited and supervised by H. J. Midwinter. Blandford Press, 1976. £2.50

This is a companion volume to *Butterflies in Colour* by the same author. It is described on the fly leaf as "an excellent field guide", but it is in fact a confused mass of inaccuracies, with errors on almost every page. We are told for example that *paleacea* feeds on oak. Numerous species are stated, quite wrongly, not to occur in Britain — the most absurd of all being *C. nigrum* and *aescularia*, whilst *Calamia tridens*, we gather, is found locally over most of England!

The colour plates lack any kind of order; different plates depict insects in four size ratios whilst the illustrations themselves are below the high standard we have come to expect from our contemporary British artists.

The most serious feature is the editor's manifest lack of acquaintance with the subject. This is not a book to be recommended, at any price.

C.R.H.

How Insects Live by **Walter M. Blaney.** Elsevier-Phaidon, Oxford. 1976. £4.50.

Photographing Nature by **Claude Nuridsany** and **Marie Pérennou** (translated from the French by J. W. Steward). Kaye & Ward, London. 1976. £6.75

Both of these books contain some spectacularly beautiful colour photographs of insects, surely one of the most photogenic groups of all living creatures. The books are, however, aimed at different readers.

In the first, the photographs blend with clear diagrams and a compulsively readable text into a most attractive account of insect biology. Introductory chapters briefly explore the structure, evolution and diversity of insects, and the bulk of the text then deals with insect metabolism, behaviour and life-cycles in relation to ecology: survival, locomotion on land, flight, feeding, vision, thigmoreception, chemoreception, reproduction, development, social life, communication, navigation, camouflage, mimicry and importance to man. The printing is excellent and author and publisher have here produced a mixture of lightly-worn scholarship and beauty of illustration which I strongly recommend for inclusion in school libraries and as a splendid present for the young naturalist.

The second book is concerned with the techniques of nature photography as applied to the small and very small. Within a rather jumbled format, useful information is given on cameras, film, lighting and other equipment for close-up colour photography, while later

chapters show the application of the suggested methods to a rather arbitrary selection of life in meadows, ponds, the sea, forests and the laboratory. Insects figure most prominently among the subjects presented, but there are also pictures of reptiles, amphibians, spiders and parts of plants. The photographs are often extremely beautiful and artistic but some topple over the edge to become "arty", sacrificing biological content for pictorial effect. This applies particularly to the disappointingly poor sections on photomicrography where nothing is left as nature made it, polarised light and other effects producing dramatic colours which obscure the science. However, the book will be of interest to photography enthusiasts and the tables of practical information are useful. Biologists will perhaps find the archness and naivety of the text less rewarding.

G.F.L.

Birds of Prey by **Philip Brown**. Pp. 124, with 21 illustrations. White Lion Publishers, London. £3.95

The present spate of books on birds of prey continues with this very readable survey. Anecdotal descriptions of the resident diurnal raptors and owls are followed by two chapters on the persecution and protection of these birds. Persecution by egg collectors and gamekeepers although illegal is insufficiently punished by derisory fines. There is a clear need for the strengthening of the law for such offences. The author describes the production of toxic chemicals as a government supported vested interest in death. Unless there is a change of outlook the future of many of our finest birds is bleak.

The illustrations are by leading bird photographers and complement the high quality of the production which characterises this series of "Survival" books.

J.D.P.

The Birdwatchers' Key (British Isles and North-east Europe) by **Bob Scott** and **Don Forrest.** PP. 271 with many colour plates. Frederick Warne. 1976. hardback £3.95, softback £2.25

This book follows the accepted style of all field guides in that it starts with drawings of 'parts of a bird' and other practical information such as measurements, apparent and actual, and a chapter on birdwatching equipment. A field guide appearing at this late stage on the path already well trodden by those anxious to put us on the right road to correct identification must offer something different. Apart from a gimmicky quick-find key to families which is marked on the page edges, this one offers nothing which has not been done adequately before.

The text for each species is well written by Scott and gives some useful points of behaviour which experienced field workers often apply when naming their bird in the absence of close views of plumage. The rest of the information is standard basic format. The plates by Forrest are far from satisfactory and do not improve on the plethora of such field guide illustrations. The flight shapes of some, notably the skuas and waders are very strange and the bills of the latter group are drawn so thin in some species, the dunlin particularly, that they could well mislead the novice. Subtleties of head shape are lacking in all but very few species and most have a comical countenance which belies the reality. The first thing an observer looks at, perhaps subconciously, is the face of a bird and the expression and head shape are very important.

In short; a new field guide must give the beginner, as well as the 'middle' experience watcher, a full range of accurate colour plates showing the variations of juvenile, sub-adult, winter and moulting plumages coupled with detailed text. This book does not offer this so why has it been produced? We have seen it all before and better.

J.R.M.

The New World Primates by **M. Moynihan**. Pp. 263. Princeton University Press, Princeton, New Jersey. 1976. £7.90

Subtitled "Adaptive radiation and the evolution of social behaviour, languages and intelligence", this book is based on the author's 16 years' observations as a primate biologist

at the Smithsonian Tropical Research Station, Panama. After a brief review of the Primates, Moynihan concentrates rapidly on the Ceboid monkeys in their characteristic rain-forest setting; the first three chapters — roughly half the book — outline the taxonomy and ecology of the group, which includes the marmosets, douroucoulis, howlers, sakis, uakaris, the titi, spider, woolly and squirrel monkeys, and the capuchins. Chapter 4 (Social relations and organizations) and Chapter 5 (Communication systems) are mainly ethological, relating behaviour of Ceboids to that of other monkeys, apes and man. Chapter 6 compares adaptive radiation in the Ceboids with the better-known radiations of Malagasy, African and Asian primates. The final chapter, short but seminal, discusses the evolution of learning and intelligence. This is a clear and well-written book, authoritative but relaxed. Index and bibliography are more than adequate. The few photographs are informative but dismally reproduced, and there are several curiously simple but effective drawings, presumably by the author.

B.S.

Nature in East Anglia by **S. A. Manning.** Pp. 160. World's Work Limited, The Windmill Press. 1976. £3.90

This is a well produced and easily readable book which should appeal to everyone interested in our natural heritage. It is well illustrated with both black and white and colour photographs, and although one of many good books on East Anglia, represents very good value.

The main sections of the book are devoted to birds, mammals, amphibians and insects, with notes on their characteristics, habitats, diets and distribution. In a section on trees and other plants, the different habitats to be found in East Anglia are described. The wealth of nature reserves is also featured and these, together with other places to visit are appended along with a list of East Anglian birds and the Country Code.

Throughout, the text is enlivened with snippets of information such as the occurrence of 32 bees in the stomach of a toad, and the fact that the fine powder formed from the decay of birch wood, caused by the birch polypore, is used as a polishing medium by Swiss watch-makers.

P.M.E-B.

An Introduction to Landscape Architecture by **Michael Laurie.** Pp. ix + 214, including numerous photographs and line drawings. Pitman, London, 1976. £6.50, paperback

Twelve topics on various aspects of landscape architecture draw attention to the importance of the earth and biological sciences and the principles of conservation in a rational approach to the solution of environmental problems arising from urban and agricultural practices. The approach also shows the value of an understanding of the behavioural and social sciences in landscape analyses and interpretation. Although based on examples drawn mainly from the United States (and, to a lesser extent, from Britain), this work will prove most valuable to environmental scientists and to students of landscape architecture and planning throughout the world.

M.R.D.S.

Simple Propagation by **Noël J. Prockter.** Pp. 246, with 41 illustrations. Faber and Faber, London. 1976. £2.95

This new and revised edition provides the interested amateur with a vademecum amply meeting his needs and foreseeing his problems in the propagation of plants by seed, division, layering, cuttings, budding and grafting. With an engagingly unpatronising style that is clear and exact in its descriptions, it rids propagatory methods of false mystique and, by dint of that, is guaranteed to leave the reader's fingers all the greener.

A.H.

Backyards and Tiny Gardens by **Judith Berrisford**. Pp. 160. Faber and Faber. 1976. £1.95, paperback

The owner of the tiniest backyard has no excuse for pleading lack of space if he cannot transform it into a thriving oasis of flourishing plant life after reading this book. Every page is packed with ingenious ideas — almost too fully in fact: readers might well find it advantageous to supplement the necessarily brief accounts of individual plants, shrubs and trees by reading the fuller treatment given them in some of Miss Berrisford's other admirable and enjoyable books.

A final chapter on garden design is illustrated with rather fussy drawings by Yvonne Skargon.

V.A.H.

Rose Growing Complete by **E. B. Le Grice**. Pp. 368 + 8 monochrome plates. [Second] new and revised edition. Faber and Faber, 1976, £2.95, paperback

An extremely informative and reliable work on all aspects of the rose and its culture, now updated since its first appearance in 1965 to include much new material. Both the novice grower and the seasoned exhibitor will find it a helpful reference book. Attention must however be drawn to a regrettable number of slight but important inaccuracies in the names of rose varieties which are to be found consistently throughout text and index and must therefore be blamed on the author rather than the printer: e.g. Louis [Louise] Odier, Ester [Esther] Ofarim, Nazomi [Nozomi], Rosa filipes Kifsgate [Kiftsgate].

V.A.H.

Soil Biology by **William Kühnelt.** Second edition, based on the translation by **Norman Walker**, prepared by **J. A. Wallwork.** Pp. 483, with 80 text figures, numerous tables and 4 plates. Faber & Faber, London. 1976. £12.00.

How pleasing it is to report the publication of a second edition of this work which has proved an invaluable aid to the soil zoologist. A new edition is long overdue, for the previous British edition of 1961 was based on that first published in Austria in 1950.

Some measure of the advance in this subject can be gauged from the bibliography which runs to 82 pages and contains over one-third post-1961 references. This makes this book essentially reference, being based mainly on a survey of soil animals which includes a 'key for the identification of the higher taxonomic groups'. Standard topics such as methodology, ecology and economic importance are included, and contributions on soil contamination (by James W. Butcher) and plant parasitic nematodes (by Charles Laughlin) appear for the first time.

It must be stressed that, despite the title, this book is for the zoologist — perhaps the full title of *Soil Biology with special reference to the animal kingdom* needs more emphasis? This work is of a high academic standard and will stimulate both the undergraduate and the natural historian to delve in and below the litter layer — a psychologically impenetrable barrier to many field biologists — where a wealth of animal life is to be found.

M.R.D.S.

Journey Through Love by **John Hillaby**. Pp. 268. Constable. 1976. £4.95

A thoroughly enjoyable and readable book, illustrated with superb photographs. John Hillaby writes of his favourite walks, in Yorkshire, Hampstead, the South Downs, the Gower Peninsula, and, further afield, the northern Appalachian trail. His learning is worn lightly, but his vivid descriptions of the plant, bird, and insect life encountered on his travels are enhanced by a deep knowledge of their habitats and habits which should appeal to all with an interest in the countryside.

Shorter Reviews

A Book of Wild Flowers by **Elsa Felsko**. Pp. xi + 231. Bruno Cassirer, Oxford. 1976. £2.50, paperback

160 delightfully-produced colour plates are supported by notes on derivation of the Latin name, habit, ecology, world distribution and economic importance by Sheila Littleboy, and a preface by Professor C. D. Darlington.

British Cumaceans by **N. S. Jones**. Pp. 62, including 20 figures. Synopses of the British Fauna (New Series) No. 7, Linnean Society of London and Academic Press, London. 1976. £1.90, paperback

Valuable keys and ecological, geographical and taxonomic notes (supported by line drawings) on the 41 species of marine Cumacea known to occur within 20 miles of the British coasts.

Agricultural Research for Development edited by **M. H. Arnold**. Pp. xi + 353, including coloured frontispiece, numerous photographs, line drawings and tables. Cambridge University Press. 1976. £13.00

A synthesis of results, on topics such as agrometeorology, soil productivity, crop physiology, plant pathology, entomology and plant breeding, based essentially on research undertaken at the Cotton Research Station at Namulonge, Uganda. An important contribution to our knowledge of agricultural research in the third world.

Animals of Oceania translated by **Irene R. Anderson**. Pp. 61. Frederick Warne, London. 1976. £2.50

The thirteenth volume in 'The Private Lives of Animals Series' is devoted to a colourful account of selected mammals, reptiles and birds which are unique to Oceania.

It's Life with David Bellamy. Pp. 32. Macdonald Educational, London. 1976. 85p, paperback

Hotchpotch of journalese, jargon and illustrations, designed (rather poorly) as an introduction to biology, to accompany David Bellamy's series of ten programmes for Thames Television this autumn. It is to be hoped that Bellamy's personality and enthusiasm for the subject will redress this when he appears on the screen.

War Against Road Transport by **R. D. Leakey**. Pp. 36. North Craven Action Group. 1976. 48p (incl. postage). Obtainable from: The North Craven Action Group, Sutcliffe House, Settle, Yorkshire BD24 0BB.

An emotional case against road transport, which is described by the author "as the second worst enemy of mankind and the natural world".

Nature in Norfolk: a Heritage in Trust. Pp. 192, with numerous coloured and monochrome plates, line drawings and tables. Jarrold, Norwich. 1976. £3.60

A valuable compendium of information on the major habitats (past and present) to be found in Norfolk, compiled by numerous authorities to mark the 50th anniversary of the Norfolk Naturalists' Trust, and excellently produced in the manner we have come to expect from Jarrold publications.

Wildlife in the Garden by **Roy Genders**. Pp. 264 + 8pp of photographic plates. Faber & Faber, London. 1976. £4.75

A clear account, ably supported by photographs and line drawings, of the wildlife to be found in the garden, with hints on how to attract a greater variety of animals to a habitat which is of particular benefit to the old or infirm.

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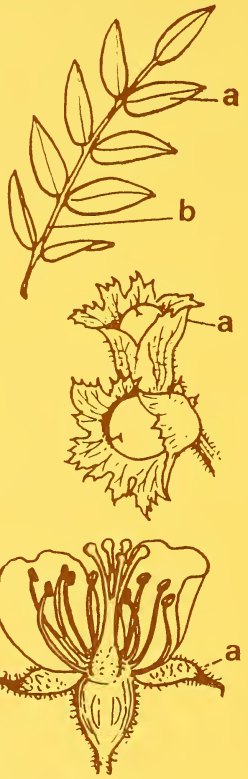
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Edited by M. R. D. SEAWARD, M.Sc., Ph.D., F.L.S., The University, Bradford

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THE BENTHIC MARINE FLORA OF LINCOLNSHIRE AND CAMBRIDGESHIRE: A PRELIMINARY SURVEY

PART 1

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ABSTRACT

The marine flora of Lincolnshire is ill-known and that of Cambridgeshire usually ignored, although there is a long history of botanical studies in both counties. Most of the early records from the area derive from a few collections by William Skrimshire and, later, by the Bury family; even in recent years, there has been little work done there in comparison with the neighbouring counties of Yorkshire and Norfolk until the present study, which also incorporates data kindly made available by colleagues. Much of this neglect is probably due to the unattractive and comparatively unrewarding physical environment for benthic floral studies. Nevertheless, artificial substrata provide interesting habitats and occasional rich growths. From a well distributed set of 68 stations, our own and other workers, we here record 100 species, of which some are at least currently 'exotic' and need further substantiation. Green algae contribute a larger proportion of the flora relative to the brown and red algae than is the case for naturally rocky shores; partly this is due to the termination in shallow depths of the artificial substrata, a reflection of the predominantly estuarine nature of the coast. There is evidence to suggest that the flora is now less rich than during the mid-nineteenth century, but some of the material that supports this conclusion could have been drift from adjacent counties. Aegagropilous forms adapted to living unattached do not seem to play a large part in the saltmarsh macro-algal flora of the area. Comparisons along and across the North Sea are presented.

1. General Introduction

Although there exist a very few early, and even fewer modern, published records from these two counties, to all intents and purposes the present states of their benthic marine floras are unknown. The collation of all traced information provides a background to our own field data gathered principally during 1974.

(i) *Historical*

The virtual absence of information on the benthic marine flora of Lincolnshire probably results mainly from the unattractive nature of the coastline. There has certainly been no dearth of previous botanical studies. Lincolnshire had one of the earliest of the pre-Linnean Botany Clubs (founded Boston, 1711, by Dr. William Stukeley). Stukeley indicated that "The apothecarys and I went out a simpling once a week. We bought Rays 3 folios of a joint stock". (Allen 1967). "Rays 3 folios" refers to the important early work *Historia plantarum* . . . (Ray 1686; 1688; 1704); volumes I and III include numerous marine algae (none localised to Lincolnshire); so that it would even then have been possible for Club members to refer algal finds to extant data. There is good evidence that during the late sixteenth, seventeenth, eighteenth, and nineteenth centuries, many of the better-known naturalists

botanized in Lincolnshire; all the indications from MSS and extant specimens are that terrestrial phanerogamic observations and material principally resulted from these visits. Even the "excellent" Adam Buddle (c. 1660-1715; cf Dandy 1958), who was born in Lincolnshire and certainly collected coastal material in Lindsey, seems on this occasion to have ignored the cryptogams. Despite careful searching, therefore, we have been able to trace only a very few specimens of benthic marine algae.

Lincolnshire is named as the location for older published data only in the case of collections by Skrimshire (see below). This is surprising; it has been shown (Price and Tittley, in prep.) that many of the other botanists concerned were competent in marine algal identification to the extent then possible. During the 400 years over which British records of marine algae have been published, Lincolnshire is thus one of the very worst served counties. (See the detailed distributional studies of Dixon, Irvine and Price, 1966; Price, 1967; and Price and Tittley, 1970; 1975.) There exist a few papers or books, mostly fairly recent and outside the studies mentioned, that incidentally refer to benthic marine algae for Lincolnshire. The oldest published records are the few appearing in Relhan (1788; 1820); in Turner (1802); and in Turner and Dillwyn (1805). Details of these appear in the species list. All, except the 1788 single Wisbech record, are based on collections by William Skrimshire from areas only just inside the Lincolnshire boundary and in places overlapping into Cambridgeshire (see later). Later authors repeat these few records. Vine (1892) provided two new records from Cleethorpes in recording algae as substrata for Polyzoa. A few species are also detailed as animal-bearing in the unpublished MSS (General library, BMNH) prepared for the *Victoria County History of Lincolnshire*; page-proofs exist of some parts of this work. Few of the many recent publications (see (iii), Physical Environment) that deal with the marine environment along and off the Lincolnshire coasts refer to algae; the most extensive data are provided by Hinton-Clifton (1964), who even so cites only five forms from the Lincolnshire coast of the Humber Estuary. The main studies on the Humber concern the Yorkshire coast (R[oebuck], 1884; Petch 1903, 1905, 1906, 1915?; Good and Waugh 1934; Philip 1936); of these Philip most fully listed the marine algae. The longest published list for Lincolnshire consists almost wholly of blue-green forms from Gibraltar Point (Stewart and Pugh, 1963). For the sake of completeness, all previously published records are cited in the main list.

Although hitherto ignored for all practical purposes concerning benthic marine phycology, Cambridgeshire has a stretch of "coastline" along the tidal River Nene (see details of the collecting station near Foul Anchor). Before the marshes surrounding the present arrangement of main banked and sluiced channels (such as the Nene seaward of Wisbech) were isolated by control of saline water penetration through the main drainage system, Cambridgeshire possessed much greater areas directly influenced by the sea. Eighteenth and nineteenth century botanical literature reveals fairly consistent mention of at least some fucoids, of some of their epiphytes, of a number of green algae, and of *Bostrychia scorpioides*, for either the marshy areas then surrounding the outer Nene, or from the Nene itself; the present Lincolnshire and Cambridgeshire were therefore both involved. Such records prove almost without exception to derive from collections by William Skrimshire (1766-1830), either as reported by Relhan (1820) or through specimens of Skrimshire's material that came to the notice of the publishing authors. Much of Skrimshire's Lincolnshire and Cambridgeshire material is now held in the collections at BM and K in BM.

Skrimshire collected from salt marshes, creeks, and "washways" in the areas seaward of Wisbech, along the Nene and subsidiary channels; around Long Sutton (seaward of Wisbech); and near Holbeach, in at least the years 1795 and 1797, according to dated specimens. Movement of saline waters in those areas was then rather less rigorously controlled than now, since the records date from the era before the fens were almost completely embanked, sluiced, and isolated from marine influence by the various successors of Vermuyden. The latter commenced reclamation with the marshes of South Holland, Lincs., and perhaps the old Bicker Haven, in c. 1660 (Kestner 1962; Steers 1964). That Skrimshire did not merely retain material and information in his own herbarium is clear from further specimens in Hooker's Herbarium [K in BM], annotated in MS Dawson Turner

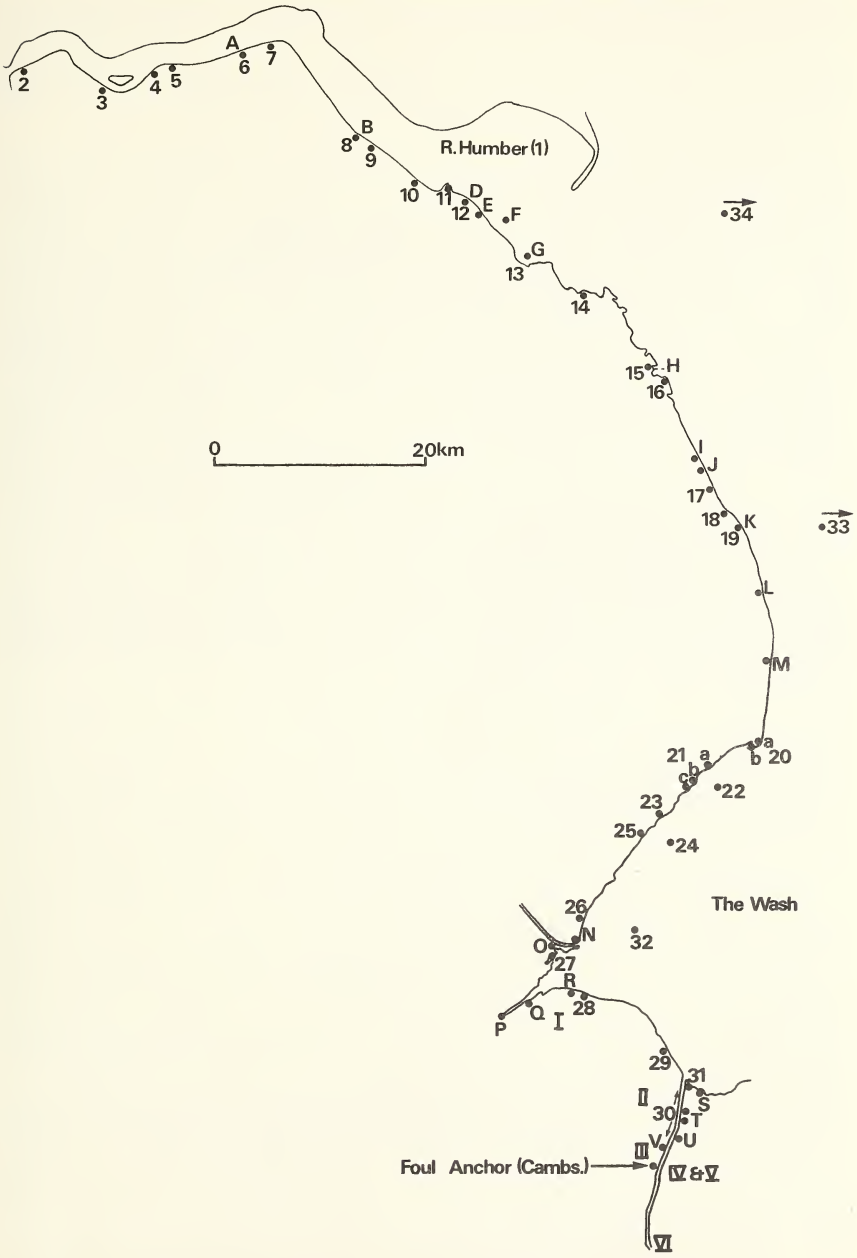


Fig. 1. The coastlines of Lincolnshire and Cambridgeshire; rivers marked are the Witham, Welland, and Nene. For station details, see pp. 8–18.

in such terms as "Wisbech Mr. Skrimshire", and from those various published data (Turner 1802; Turner and Dillwyn 1805; Greville 1830; Harvey 1846) that depend clearly, and virtually solely, on Skrimshire's information. However, annotations on a few specimens do suggest that Turner himself also collected at Wisbech. Full details of the Skrimshire material are incorporated in the species list and the probable locations of his collecting stations are considered in the second part of the station lists.

Dr. B. Gittins and Professor P. S. Dixon have brought to our notice Mrs. Edward Bury's Herbarium, now in the Library of California State University at Long Beach. Vols. 1 and 2 [Accession nos. 119407, 119408] of her *British Algae* contain Lincolnshire material of some interest: apart from many algae collected from the Scarborough area (by William Bean II, which, with the dated specimens, fixes the period to 1848-1866), the Bury Herbarium includes specimens localised to Cleethorpes (principally) and Grimsby Dock. The Cleethorpes material is variously dated 1848 (Jan.; Oct.; Nov.; Dec.) or 1849 (dates in Jan.; Feb.; May; Dec.). Three specimens are annotated in detail sufficient to establish that members of the Bury Family were involved in collecting at least a proportion (and probably all) of the Cleethorpes plants during those years. It seems there were then extensive oyster beds at Cleethorpes, for the same three specimens are annotated as derived from that habitat. The Cleethorpes material includes some species which were collected from the drift, some which were certainly not so, and other about which there remains doubt. Many specimens, attached and drift, represent species that are rather exotic compared to the present Lincolnshire marine flora. Through the assistance of Professor Dixon and Dr. T. B. Widdowson, we have been able to examine relevant Bury specimens; data occur in the species lists, without reference to original misdeterminations or erroneously applied names.

The few other minor older collections of relevance, derived from Lewis Weston Dillwyn's Algae [K in BM]; from Mrs. Griffiths' Herbarium, the material being collected from Wisbech, probably by M. J. Berkeley, on 19/12/1828 [K in BM]; and from G. H. Caton-Haigh, who briefly collected in 1912 from the alluvium of the south side of the Humber Estuary [BM], are also noted in the species list.

(ii) *Recent collections*

Several collections made by the late Miss N. Wallace (1969) and by C. Jukes (1970) are included. Trinity House personnel collected (1970) marine algae from the North East Docking Buoy, 14 miles north-east of Skegness. Miss Joan Gibbons has provided particularly useful local information. Colleagues whose independent investigations incidentally involved data on benthic marine algae in Lincolnshire have also supplemented our collections. Drs. P. J. G. Polderman (Katholick Universiteit, Nijmegen) spent some weeks working from the Gibraltar Point Field Station during summer, 1973; some of the results are published (Polderman 1974a, b). Dr. Susan Coles (Institute of Terrestrial Ecology, Norwich) worked on the Lincolnshire section of the Wash during 1973-74, when use of transects and permanent quadrats produced many benthic algal records from a number of stations. One of us (JHP) made a brief reconnaissance trip to inner Boston Haven and Chapel Point, Chapel St. Leonards, in July 1973. Resultant specimens and data from all these collections are referred to in the species lists.

The bulk of the lists, however, in both species and numbers of records, derives from our own collections made during a visit of 7 days in June, 1974. All stations are mapped in text fig. 1; our own are briefly described later in relation to the physical environmental conditions outlined in the next section.

(iii) *A general account of the physical environment, concerning especially the substrata*

The National Parks Commission Coastal Preservation and Development Report (1968) on the coasts of Yorkshire and Lincolnshire states (p. 40) that measurements made along the high water mark on the 1″:1 mile Ordnance Survey maps, including inlets considered to be

"arms of the sea" (e.g. below the lowest ferry point), show the length of the Lincolnshire coastline to be:

Grimsby Co. Borough	3.7 km (2.3 miles)
Lincs. (Holland) C.C.	48.6 km (30.2 miles)
Lincs. (Lindsey) C.C.	119.9 km (74.5 miles)

This gives an overall total of 172.2 km (107 miles). Only 20% of that length has suffered industrial, commercial, domestic, or recreational exploitation, although the Grimsby County Borough area is considered by the report as 100% devoted to industry and commerce. Lindsey has 9 miles (14.5 km), or 12.1%, of its coastal fringe affected, with most of the actual and proposed industrial or commercial exploitation being on Humberside, around Grimsby and as far to the north as East Halton Skitter. Minor areas of exploitation occur between Chowder Ness and about a mile east of New Holland, especially including Barton Waterside. Areas of coastal frontage that are substantially built-up for domestic or recreational purposes exist only in Lindsey; by 1968, 12 miles (19.3 km), or 16.1% of its coastline was so affected. The total length of exploited, sometimes relatively inaccessible, coastline is therefore only 23.3 miles (37.5 km). In such areas, both Hinton-Clifton (1963; 1964) and we ourselves have still found locations of faunistic or floristic interest. Camping and caravan sites away from built-up areas affect a further 5.3 miles (8.5 km, or 7.1%) in Lindsey. Holland lacks exploitation of any of these kinds.

Natural conditions along the Lincolnshire coastline reveal three predominant physical environmental characteristics: mud; sand; and very turbid inshore waters. Descriptions of the topography and general substrata along and off the Lincolnshire coast are rather widely scattered; covering part or the whole of the county, they occur in the marine zoology MS of the unpublished *Victoria County History* (see earlier), and in Walcott (1861); Newman & Walworth (1919); Young (1955); Gray (1959); Hinton-Clifton (1963, 1964); King (1964); Robinson (1964); Steers (1964); Johnson (1970); and Firstbrook & Ratcliffe (1974). Steers (1964, p. 404) has summarised the situation as regards substrata: ". . . From Sewerby, on the southern side of Flamborough Head, to the north-eastern corner of the Wash, near Hunstanton, the shoreline is in many ways very different from that in any other parts of England and Wales. The present shore is formed almost wholly of boulder clay and recent deposits, mostly alluvium . . . ". He also remarks that the Humber is probably the muddiest of British rivers, with the silt being brought in by the tide; the original source of material is Holderness. Freshwater downflow adds little, but the estuary locally redistributes the silt.

Considerable amounts of this mud appear patchily along the intertidal foreshore of almost all the Lincolnshire coast, although the stretch between Mablethorpe and Skegness predominantly reveals overlying sand. The Humber shore east to Cleethorpes and the shores of the Wash south from the southern boundary of Skegness are both predominantly of mud, at least as to the inshore stretches. The natural substrata, with few exceptions detailed below, are therefore highly mobile unless protected from the effects of currents and wave-action; the resultant water turbidity is also probably important as a constraint on the benthic marine flora (see later).

Clearly, the attachment and growth of benthic marine macro-algae in Lincolnshire are very largely dependent on the presence of artificial substrata of various forms, although there are exceptions. For example, in the marshes and on the banks of streams and cuts, benthic green algae, especially, occur attached to small fragments of stone, shell, and the like, buried in mud/sand mixtures, whilst the roots of grasses and of phanerogams like *Halimione*, at the appropriate levels, support a comparatively rich flora in terms of individuals (but *not* of species). *Blidingia marginata*, *B. minima*, *Enteromorpha torta*, *Rhizoclonium riparium*, and *Ulva lactuca* are commonly the only species exploiting higher plant roots. This is well seen at Gibraltar Point, at Tetney Haven, on the Nene Outfall Marsh, on the foreshore marsh south of Cleethorpes, and in the extensive marshes along much of the western and southern shores of The Wash. Artificial substrata that provide important support for benthic marine algae on this coastline are listed below; examples of

almost all types are presented in descriptions of BM stations that follow. The principal structures that introduce flora of stable substrata where naturally none would exist are breakwaters (groynes) of wood or concrete; sea-walls of concrete and stone; reinforcements of cut channels or of sea banks, usually by overlaying of large amounts of limestone or slag blocks, irregular in shape and size, especially along the upper mud levels; other reinforcements of steeper sides of navigationally important channels, usually by lining of metal sheeting or wooden beams; quays and harbour wall extensions, employing massive wooden beaming; pier supports and old offshore forts, usually of metal on concrete foundations; and hulks or remains of old wooden or metal vessels lying partially buried in mud or sand. Less usual are twigs and tree branches, driven into mud to consolidate the upper flatter levels just below the periphery of marsh phanerogam flora (e.g., along cut channels such as the Welland and, especially, the Nene). At approximately the same level, these provide essentially similar substrata to the exposed roots and lower stems of *Halimione* and grasses; they carry much the same benthic flora.

Substrate nature has been emphasised over other factors in the physical environment since, from available data, the latter do not seem to be outside ranges commonly to be encountered around British coasts. For general comparative background on tidal rhythms and ranges; climatic factors such as air temperatures, sunshine, fog, and rainfall; salinity; and the residual north to south water movements along the east coast of England, see Lewis (1964). Johnson (1970), presenting data specific to the Lincolnshire coast, principally for The Wash but with relevance also to the more northerly parts, considers tidal streams, residual current systems, and seasonal water temperature and salinity patterns for 1959 to 1963. One general comment by Lewis (1964) deserves quoting: ". . . At high tide the amount of light penetrating to the lower levels of the shore may be small and its spectral composition changed, especially in areas with a big tide range or with constant turbidity. Most of the population probably carry out the majority of their essential activities when submersed or immediately after the tide recedes, but the restriction to the upper shore of many of the species described . . . suggests that prolonged submersion is not entirely suitable for some activities, or at some stage in the life cycle . . .". Lincolnshire has both a large tidal range (Grimsby : 19′ extreme springs range) and water of consistent turbidity, surpassing even that of south-eastern shores such as Kent. Although the primary restricting factor is clearly that stable artificial substrata present do not generally penetrate beyond the very shallow infralittoral, it seems very probable that the almost complete absence of, for example, *Laminaria* spp. from even those few examples of deeper substrata of adequate stability is also a direct reflection of the very turbid water conditions that exist over the whole of the area.

2. Station Lists

A long descriptive section on general benthic marine algal ecology of these coasts has been avoided by the presentation here of brief descriptions of each of our own collecting stations. This has not been attempted for stations of other workers; with few exceptions, generally already published, the data are wholly inadequate. In both parts of the lists, stations are given in geographical order north to south as far as the Welland Outfall stations, then from west to east across the inner Wash shores, resuming the north to south sequence into the Nene and through the Cambridgeshire stretches. Station positions appear in fig. 1.

BM(NH), 20 June to 26 June, 1974; including brief ecological data

Lincolnshire

A. *NEW HOLLAND* Grid refs. (i) TA/084245; (ii) TA/085246. 21 June 1974.

(i) East side of creek seaward of Ferry pier. Boatyard/Breaker's Yard slipway area. Old metal hulks sunk in mud, slipway structure itself, and adjacent broken brickwork, also sunk in mud. All parts (but especially the latter) bore luxuriant cover of fruiting *Fucus vesiculosus*. Underflora chiefly of *Enteromorpha* spp. Epiphytic *Pilayella* present.

(ii) Further east, around a small point and away from the Yard. Small blocks (largely limestone or broken brick) of irregular shape and size sunk in and lying on surface of mud down to about MTL; distribution patchy and irregular. Mud oozy, but more or less consolidated since tidal and wave-action clearly extremely gentle. Some emerging wooden remains (mostly ribs) of old vessels. Flora best developed on stones and bricks; major flora of *F. vesiculosus*, of which a band is recognisable at and above MTL wherever stones occur. Underflora generally of *Enteromorpha*, which also rises upshore; *Ulva lactuca*, mostly small plants but some quite long specimens, also present, the patches becoming larger and more continuous towards the east in upper *F. vesiculosus* band. Stones of chalk and limestone at upper fringe of the blocks area carried a boring flora of green and blue-green algae. *Enteromorpha* epiphytic on fucoids, and, mixed with *Blidingia* and *Rhizoclonium riparium*, growing both amongst and on bases of phanerogam (largely grasses) turf/marsh on top of isolated 5′ high areas of consolidated mud at top shore. Also extends down face of mud.

B. *SOUTH KILLINGHOLME HAVEN* Grid ref. TA/187173. 21 June 1974.
Very muddy creek and its outfall, alongside N.C.B. loading conveyor. Liberal scatter of glittering metallic ore dust throughout whole area. The fresh water creek debouches over the foreshore between deep mud banks. Mud mostly bare, but a scattered stone fringe at about upper MTL bears *Enteromorpha* in some patchy profusion; occasional spread to adjacent consolidated mud below stones noted. Quite luxuriant *Vaucheria* patchily on mud, at around MTL, a few yards into the creek but well within tidal influence. Much dried drift *F. vesiculosus* seen, but no attached benthic brown or red macroflora detected.

C. *GRIMSBY FISH DOCKS* Grid refs. TA/281114 to 282113. 21 June 1974.

(i) Sloping lower parts of artificial seawall forming outer boundary of No. 3 Fish Dock. Terminates in sand at lower *Fucus spiralis* level. Whole lower slope of about 45° angle covered by pure luxuriant population of *F. spiralis* as dominant continuous band. Rather rope-like *Pilayella littoralis* and *Enteromorpha* spp. form both under- and epiphytic flora.

(ii) One of the piers constructed of open frame of massive wooden beams bolted into horizontal and vertical lattice-work. Metal sheathing driven into mud at base as protection. Strangely, no *F. spiralis* carried, although the piers are at least as high as the seawall top. The very dense fucoid along the lower horizontals of the pier was all *Fucus vesiculosus*, the well-bladdered sheltered-water form. *Enteromorpha* spp. formed a band vertically above the fucoids, chiefly on the vertical beams; also occurred as under-flora and as epiphytes on the fucoids.

(iii) Observation only, no access being possible. Noted on the stones of slag and limestone resting on and in mud between the central triangular form piers were the same dominants as in (ii) above and (iv) below — *F. vesiculosus* and *Enteromorpha* spp.

(iv) Similar area to (iii) above, but with easy access via the island lock retaining wall. Large dump of slag and limestone blocks of irregular shape and size, but mostly around 30 cms diameter, resting in and on mud abutting the outside of island lock wall at root of wooden pier. Major flora of *F. vesiculosus*, with small upper fringe of *F. spiralis*. Underflora to *F. vesiculosus* chiefly of *Enteromorpha* spp., with rarer *Pilayella*; quite patchily frequent *Audouinella purpurea* on the mud surface (but sparse overall); locally dense *Polysiphonia urceolata*, with epiphytic *Entophysalis conferta*, mixed with occasional *Ceramium diaphanum*. Several plants (*Audouinella* sp.) detected epiphytic on *Polysiphonia urceolata*. The solid stone and slag substrate dies out to bare mud at about MTL.

D. *CLEETHORPES* Grid ref. TA/308089. 21 June 1974.
Wooden groynes near and to the east of the Pier. The groynes, which terminate at about MTL level, stand terminally and occasionally laterally in water, retained as pools even at low tides due to sand scour creating hollows. Surrounding beach is of sand, with some admixture of mud. Groynes are strongly barnacle *(B. balanoides)*-covered, and *Porphyra umbilicalis* occurs attached to the latter. The main flora is of *Enteromorpha* spp., including skeins of *E.*

torta trailing into the standing water. Groyne bases carry sparse amounts of *Cladophora* sp., *Petalonia fascia*, *Pilayella littoralis*, and *Ceramium diaphanum*. Sparse and small growths of *F. vesiculosus* occur amongst the *Enteromorpha*.

E. *BUCK BECK MARSH* Grid refs. TA/328068 and 331065. 24 June 1974.

Fairly young salt-marsh lying on either side of the large drainage channel and sluice of the Buck Beck, which outfalls via a deep channel in the sandy foreshore seaward of the golf course south of Cleethorpes. Marsh is formed at the rear of the foreshore, on sand and sand/mud mixtures; a narrow bare area, between marsh and marram/couch-fixed dunes behind, exists at rear of the marsh. Central to the marsh stretch on either side of the channel are areas where vegetational stabilisation has led to raising over the rest of the marsh. There the predominant component is *Halimione*; at the seaward fringe of the marsh, *Spartina* patches show active spread, with patches of *Salicornia* also present. Predominant component of the algal vegetation were the festoons of long twisted, often very bulky, clumps of mixed *Enteromorpha prolifera/E. torta* skeins. Pools included large plants of *Ulva lactuca* and *Enteromorpha linza*. Drainage channels showed occasional large clumps of *Chaetomorpha linum*. The actively spreading marsh-fringe was characterised by "meadows' of *Vaucheria* sp., mixed with very variable amounts of *Rhizoclonium riparium*. Roots and lower stems of *Halimione* (especially) and *Spartina* (less) carried *Blidingia minima*, *Rhizoclonium riparium*, and *Ulothrix flacca*. Drift *Porphyra umbilicalis* (large) and *Fucus vesiculosus* were widespread.

F. *HAILE SAND FORT* Grid ref. TA/349061. 24 June 1974.

Nearly 1 mile out from shore on sands off Humberston Fitties, north of Tetney Haven. Constructed of metal (iron) on concrete foundations buried in sand; now badly rusted in lower parts — the surrounding area of sand being littered with stones and a large quantity of of metal debris. Major cover of fort sides and debris is of *Balanus* and *Mytilus*. Much discoloured zoophyte growth over especially the *Balanus*. Algal flora poor; major constituent was *Ulva lactuca*, developed most luxuriantly as wide band of sizeable individuals on seaward-facing side of fort. Few scattered but quite well developed *Porphyra umbilicalis* plants in upper *Ulva lactuca* band. Rather lower down, a few clumps of tetrasporic *Ceramium diaphanum* were present. Short small clumps of *Pilayella* extended sparsely down from the same level to MLWS, at which level the fort sides disappeared beneath debris and sand. The surrounding debris supported the same flora as base of the fort. Adjacent to the fort, old wooden supports and ribs of battered hulks emerge from the sand. Predominant flora on these is of *Enteromorpha intestinalis* with *Pilayella*; one plant of *Petalonia fascia* was detected. Small stones carrying *F. vesiculosus* (mostly; in fruiting condition) and (rarely) *F. spiralis* were noted wedged amongst the debris around the fort; *F. spiralis* was also sparsely present as scattered young plants attached on the fort sides at about *Porphyra* level. Shells distributed on the sand in the immediate vicinity were colonized by a boring flora of green and blue-green algae. The fucoid material could have derived as drift from the adjacent Tetney Haven *(q.v.)*.

G. *TETNEY HAVEN* Grid ref. TA/349040 to 386034. 24 June 1974.

Area includes both artificial stabilising stones and marsh areas, as substrata. Arms of mobile mud between the outfall channels of the fresh water Louth Navigation have been stabilised, in part at least, by the deposition of long ridges of small blocks of limestone along their crests. This firmer substrate terminates irregularly at about upper *F. vesiculosus* level along the sides of the channels, giving way to bare mud undergoing colonisation by vast meadows of *Vaucheria* in places. The artificial stone ridges are massively covered by *Balanus* and bear a luxuriant cover of *Fucus spiralis*, strongly in fruit. The lower fringes of the stone areas bear a few scattered plants of *F. vesiculosus*, also in fruit. Both fucoids carry *Elachista fucicola*. The lower fringes also show a scattering of attached plants of *Porphyra umbilicalis*. Throughout, *Enteromorpha intestinalis* occurs on both mud and stones, as underflora to the fucoids; *Blidingia minima* is also present on the higher stones. To the north and west of the

stabilised outfall channels occur vast flat areas of sparsely colonised incipient marsh, with large areas of clear mud or very open populations of plants. Open and isolated, but luxuriant, patches of *Zostera* are present amongst the *Spartina* and *Salicornia*; the fringe of algal colonisation is represented by massive "meadows", hundreds of yards in extent, of *Vaucheria*. Skeins of mixed *Enteromorpha torta* (principally) and *E. prolifera* (less) are widespread everywhere. Shells buried throughout the mud surface carried the already-mentioned boring blue-green/green flora.

H. *SALTFLEET HAVEN* Grid ref. TF/460935 to 470935. 24 June 1974.

Long, artificially-straightened outfall cut, with very muddy, gently sloping banks. Very little algal growth, except for *Blidingia minima* on grass roots along the upper fringe of the mud. Outer ends of the cut are partly consolidated by deposited stones, which may bear fucoids and *Enteromorpha*. It was not possible to examine these.

I. *MABLETHORPE* Grid ref. TF/510851 to 511852. 22 June 1974. (Fig. 2).

Northern groyne at Mablethorpe is a combined sewage outfall/groyne constructed of concrete and wood beams. Other groynes to south are simple and of wooden construction only. The flora of all is essentially similar, but the most northerly one is floristically slightly richer. All groynes are bedded in sand. Inner region of the northern groyne is of concrete and is covered; major flora at the inner end of the sides is *Fucus spiralis*, grading out quickly to a few stragglers along the levels below. Adjacent groynes to south are patchily variable at this level in terms of the luxuriance of *F. spiralis*; possibly those with luxuriant *F. spiralis* are not so subject at this time to sand scour and movement. Patchily at the upper levels with *F. spiralis* occurs *Porphyra umbilicalis*. *P. umbilicalis* is more abundant on some adjacent groynes to the south. At about mid-distance and mid-level, the covered concrete channel gives way to an open-topped wood beam construction showing very gentle gradation down to its termination at about upper *Fucus vesiculosus* level; the latter species is lacking. Sides of the open channel are continuous wood, not open-work frame. Section across the wooden channel at about one-third distance downshore shows the distribution of flora in Fig. 2. Both *Callithamnion hookeri* and *Polysiphonia urceolata* grade out down-shore gradually, dying out at about 3/4 distance along the channel. The indication *"Enteromorpha"* on the section covers *E. intestinalis* and *E. compressa* forms, with some *Blidingia marginata* above. *Polysiphonia urceolata* included admixture of tetrasporic *Ceramium diaphanum*. *Pilayella* bore intercalary unilocular sporangia; *Callithamnion hookeri* was procarpic. *Porphyra* bore occasional *Pringsheimiella scutata*.

J. *TRUSTHORPE* Grid. ref. TF/519832. 22 June 1974.

Groynes, of simple wood construction like those of Mablethorpe, seaward of Trusthorpe Hill Bungalow Estate. Flora and distribution essentially similar to Mablethorpe. Rather less *Callithamnion hookeri*, which was abundantly procarpic. More luxuriant *Porphyra umbilicalis* than on Mablethorpe groynes. The latter are generally longer than those at Trusthorpe.

K. *ANDERBY CREEK* Grid. ref. TF/554759. 22 June 1974.

Outfall of the Creek across the shore is channelled into a deep combined channel/concrete groyne. Populations and positions in which carried were essentially similar to the situation at Mablethorpe, but there was very little (a single clump) of *Callithamnion hookeri* (very richly procarpic) and few clumps of *Polysiphonia urceolata*. *Fucus spiralis* was also very sparse, probably because the channel/groyne and adjacent groynes were both shorter in length and more generally sand buried than the Mablethorpe/Trusthorpe ones.

Essentially similar situations with groynes in sand, but carrying a very much poorer flora in variety of species (mainly greens only — *Enteromorpha* spp., *Rhizoclonium riparium*), were detected at L and M.

L. *CHAPEL ST. LEONARDS* Grid. ref. TF/563733. 22 June 1974.

Groynes of wood beams in sand, near Chapel Point. [Also included are collections by J. H. Price from Chapel Point on 30 July 1973.]

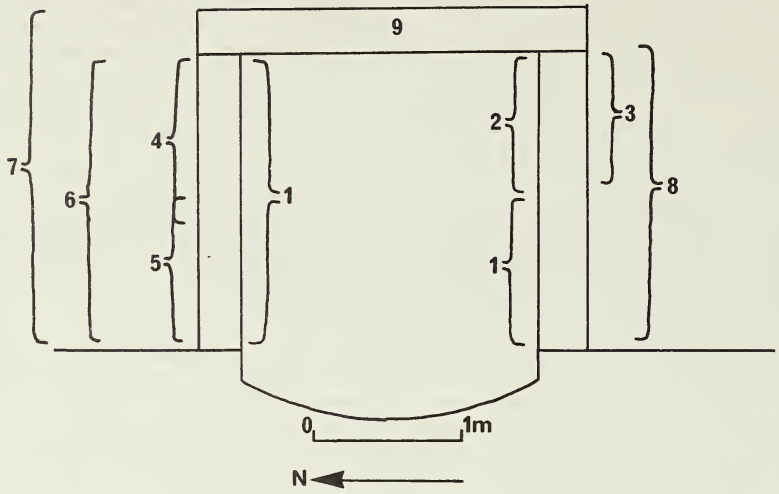


Fig. 2. Section across the northern groyne, Mablethorpe (Stn. I), showing distribution of flora on the wooden construction of the channel at about 1/3 distance downshore. The section faces seaward; the left side is north.

1. = *Enteromorpha*
2. = Luxuriant and dense *Polysiphonia urceolata*
3. = Some *Pilayella* and *Callithamnion hookeri*
4. = *Callithamnion hookeri*
5. = *Polysiphonia urceolata*
6. = *Pilayella*
7. = *Enteromorpha* and *Balanus balanoides* (abundant)
8. = *Enteromorpha* and *B. balanoides* (more scattered)
9. = Mostly *Enteromorpha* and *Ulva lactuca*; few *Fucus spiralis* plants.

M. *SKEGNESS* Grid ref. TF/574635. 20 June 1974.
Wooden groynes to north of beach at commencement of sand dunes beyond the Pier.

N. *BOSTON HAVEN (WITHAM OUTFALL), outer end, north side*, Fishtoft Road end to the terminating point. Grid ref. TF/381390 to 398393. 22 June 1974. (Figs. 3 and 4.)

Natural substrate of mud, with limestone blocks of small dimensions spread from about MTL (lower *F. vesiculosus* level) and above (to upper side of *Pelvetia* level) over the surface to anchor the substrate of this important ship channel. Above the natural mud-level, therefore, the haven is artificially banked. Luxuriant fucoid growth on the continuous blocks and on stray lower blocks is the predominant aspect of both north and south sides of the Haven.

The north side fucoid cover included fruiting material of *P. canaliculata*; *F. spiralis*; and *F. vesiculosus*. *Ascophyllum nodosum*, not detected anywhere locally attached, was noted in the drift as young, vigorous, but sterile material. Under-flora of the fucoids included *Enteromorpha intestinalis*; *E. compressa*; *Blidingia marginata* (on grass bases, on *Halimione*, and on adjacent mud), intergrading with *B. minima* (also on *Pelvetia*); *Rhizoclonium riparium* (on *Halimione* and grass bases); *Audouinella purpurea* (see Fig. 4);

and fruiting *Callithamnion roseum* (see Fig. 4). *Elachista fucicola* was detected. Pools in the lower shore, on the less steep mud, showed mud-fixed fragments of *Gracilaria verrucosa*; fruiting and sterile *Griffithsia flosculosa*; *Ulva lactuca*; and tetrasporic *Polysiphonia nigrescens*.

O. *BOSTON HAVEN (WITHAM OUTFALL), outer end, south side,* Grid ref. TF/373392 to 385389. 25 June 1974.

Flora is very like that of the north side, but is linearly differently distributed along the Haven. On the south side, the stone cover of the bank area does not commence until point 375391, but is thence outwards to the end of the Haven more extensive and better maintained than at present on the north side. Fucoids from that point outwards are therefore much more luxuriant and spread over more of the shore. However, there is still the bare mud area, with a few stones, below the dense upper *F. vesiculosus*; the latter species comes in again around LW level on a few stones there. The south side is more scoured by current pattern, as the water sweeps in around the concave southern curve; the effect is to cause enrichment of the fucoid growths and presence earlier (i.e., further into Haven) of all populations than on north side. Species present are much less luxuriant and mostly much nearer the seaward tip of the bank, on north side; they are already present at a point immediately opposite Fishtoft Road end on the south side. These include *Audouinella purpurea*; *Callithamnion roseum*; *Ulva lactuca*; and the three major fucoids mentioned above. Fucoid growth augmentation is also to some extent influenced by the presence of more head-size stones, net-anchored along marsh-strip top in places, on south side. Again, no attached *A. nodosum* was detected. Under-flora and subordinate flora were exactly as listed for north side, with more *Elachista fucicola* present, and more dark skeins of *Rhizoclonium riparium* on the mud surface; habitat characteristics of the flora were as mentioned for north side. Sparse *Porphyra umbilicalis* was noted on the muddy rocks opposite Fishtoft Road end. Boston Haven carries what is probably the most luxuriant benthic marine flora of any part of Lincolnshire.

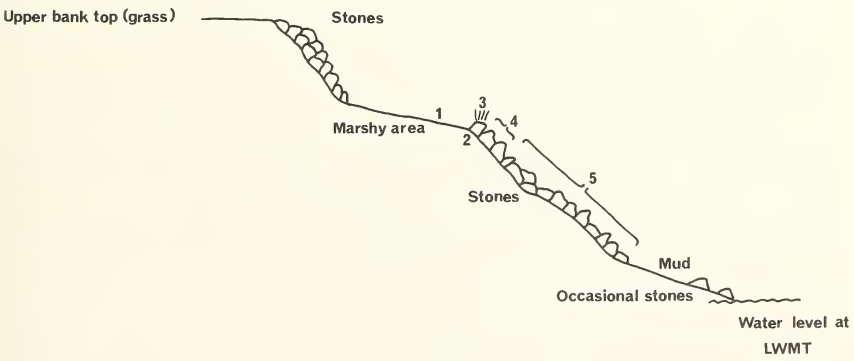


Fig. 3. Stn. N, outer Boston Haven, north side. Profile A, at Fishtoft Road end. LWMT = low water of medium tides. Semi-diagrammatic; only approximately scaled.
1. = *Halimione* (multiples and spreads over marshy area near the mouth)
2. = *Blidingia* (on stones and on *Pelvetia*)
3. = *Pelvetia canaliculata*
4. = *Fucus spiralis*
5. = *Fucus vesiculosus* (some in fruit).

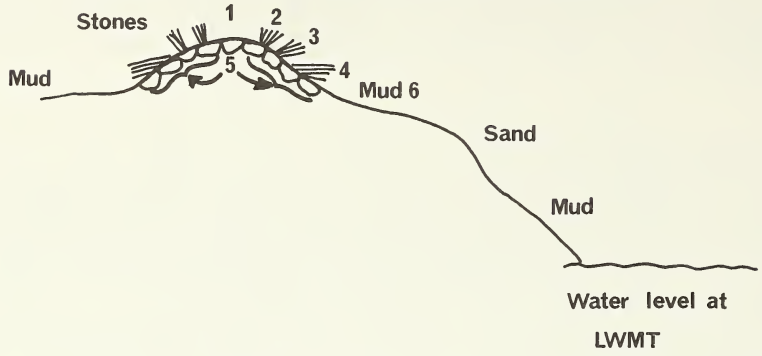


Fig. 4. Stn. N, outer Boston Haven, north side. Profile B, near terminating point. LWMT = low water of medium tides. Semi-diagrammatic; only approximately scaled.
1. = Bare limestone blocks
2. = *Pelvetia canaliculata*
3. = *Fucus spiralis*
4. = *Fucus vesiculosus*
5. = *Blidingia* (under fucoids and in open)
Enteromorpha (rock surfaces)
Audouinella purpurea (sides of stones, upper shore)
Callithamnion roseum (deep in shaded cracks, recumbent on mud).
Considerable diatom cover over rock surfaces.
6. = Bare mud (shallow pools at intervals, with partially mud-embedded *Polysiphonia nigrescens*; *Gracilaria verrucosa*; *Griffithsia flosculosa*; *Ulva lactuca*).

P. *WELLAND OUTFALL, FOSDYKE BRIDGE, NORTH EAST SIDE*, true left bank of Welland. Grid ref. TF/321323. 25 June 1974.

Raised concrete landing stage with petrol supply point. Steep mud on either side of this was collection site. East (seaward) side was steeper and had fewer stones on the mud, save down at about MTL water line. Attached to blocks in the mud were *Fucus vesiculosus*, *Enteromorpha intestinalis*, and *E. prolifera*; *Blidingia minima* was on the outer wood beam stanchion. Western (landward) side of shallower slope, had more stones but was otherwise essentially similar, with similar but differently developed flora; there was more *Fucus vesiculosus*, and *Blidingia marginata/B. minima* were additionally present on grass roots above the mud. One small plant of *Porphyra umbilicalis* was noted, attached to a stone.

Q. *WELLAND OUTFALL, (FOSDYKE WASH), SOUTH SIDE*, true right bank of Welland. Grid ref. TF/343338 to 347340. 25 June 1974.

Much less consolidated bank than either Boston Haven (especially) or Nene Outfall. Very glutinous mud, firmed up in parts by admixture of sand. Fucoids *(F. vesiculosus)* present on MTL water-line spasmodically along whole examined length; best developed landward of sluice north of Middle Marsh Farm, at 347340, where presence of some small limestone blocks over mud assists development. *Halimione* along the banks lacks *Bostrychia* or *Catenella*. *Blidingia minima* was on wood and on *Fucus vesiculosus*; *Enteromorpha intestinalis*, *E. prolifera*, and *E. torta*, were all on fixing wood; *Vaucheria* sp. was noted in drainage channels amongst *E. prolifera*.

R. *PUFF SAND MARSH*, landward of Puff Sand, south shore of the Wash, near Holbeach St. Matthew. Grid ref. TF/407347. 25 June 1974.

Edge of colonisation of the marsh, along the bank of large drain near the outfall sluice of another unnamed drain from inside the sea-bank. In no way an unusual flora, with *Fucus vesiculosus* (present as luxuriantly-bladdered material actually within the main drain); *Ulva lactuca* (in large populations on plant roots in pools near the main drain); *Entermorpha prolifera* (in smaller drainage channels into the main sea drain); *E. intestinalis* (on mud in upper bank parts); *Vaucheria* sp. (on lower mud near drain side, both on open mud and at fringe of the colonising *Salicornia*, in turn fringing the main drain waters); *Blidingia minima* (on *Halimione* and over mud surface); and *Rhizoclonium riparium* (on *Halimione*, with *Blidingia*).

RIVER NENE OUTFALL CUT, from just south of South Holland Main Drain sluice, to the Nene mouth. Grid ref. TF/475197 to 497265. 23 June 1974. (Fig. 5)

S. MARSH AT THE NENE MOUTH.

T. CUT, BY SLUICE ROAD AND HOSPITAL ROAD.

U. CUT, BY SUTTON BRIDGE

V. CUT, BY SOUTH HOLLAND MAIN DRAIN.

West (true left) bank, examined from inner point (475197) to Sutton Bridge; east (true right) bank examined from small sluice 50 metres south of Sutton Bridge, right out to top of marsh beyond reclamation project round tip of east bank. The Cut bank from Sutton Bridge outwards is largely bare mud with very abundant brown diatom cover. Marine benthic flora (principally *Fucus vesiculosus*) exists mainly where stones overlie and are buried in mud, mostly along water level at about and just above MTL. Patches of stones stretch up to fringe of marshy grass in a very few places. Amongst and just below the marshy grass are pools with *Blidingia* and *Rhizoclonium*. At about the same level, artificial consolidation by buried branches with twigs emerging from the mud surface gives substrate for *Blidingia*, inwards along much of the River Cut from the Old Lighthouses.

One of the most important areas of high level consolidated stones in the Cut is on either side of the sluice outfall at Sluice Road (TF/489234, see Fig. 5). There is found the only traced population of *Fucus spiralis* (luxuriant; fruiting; bearing *Elachista*) in the Nene Outfall Cut; *F. vesiculosus* also vigorous there; *Enteromorpha intestinalis* abundant at most levels. Even a few clumps of attached *Mytilus* were detected there along stones at about LWN/LWS level.

Otherwise noted were *Ulva lactuca* (marsh pools at and beyond Nene mouth); *Blidingia minima* and *marginata* (abundant on *Halimione* lower stems); *Vaucheria* sp. (fixing mud amongst *Salicornia* in open fringe of colonisation on mud; also penetrating back into fringe of fuller colonisation); *Fucus vesiculosus* (general, sometimes luxuriant; in patches commonly about MTL but extending above where stones in mud available); *Ulothrix flacca* (amongst *Enteromorpha* on marsh by Nene mouth); *Rhizoclonium riparium* (on marsh at Nene mouth; on bases of phanerogams enmeshed in mud); *Enteromorpha torta* (on bases of *Halimione*, in marsh at top of Cut bank and at mouth of Nene); *E. intestinalis* (on rocks at intervals throughout Cut; sometimes in "pure" population, as under Sutton Bridge); *E. prolifera* (on rocks in mud, Nene Outfall Cut by South Holland Main Drain sluice).

Cambridgeshire

Near *FOUL ANCHOR VILLAGE*, true left (west) bank of tidal saline Nene, Cambridgeshire. Grid ref. TF/466177 to 465171. 23 June 1974.

Cambridgeshire surprisingly still possesses a short "coastline" within the sphere of marine influence. This is that tidal stretch (30.5 km) of the River Nene from near the village of Foul Anchor (at TF/467178) and the confluence of the Nene with the North Level Main Drain

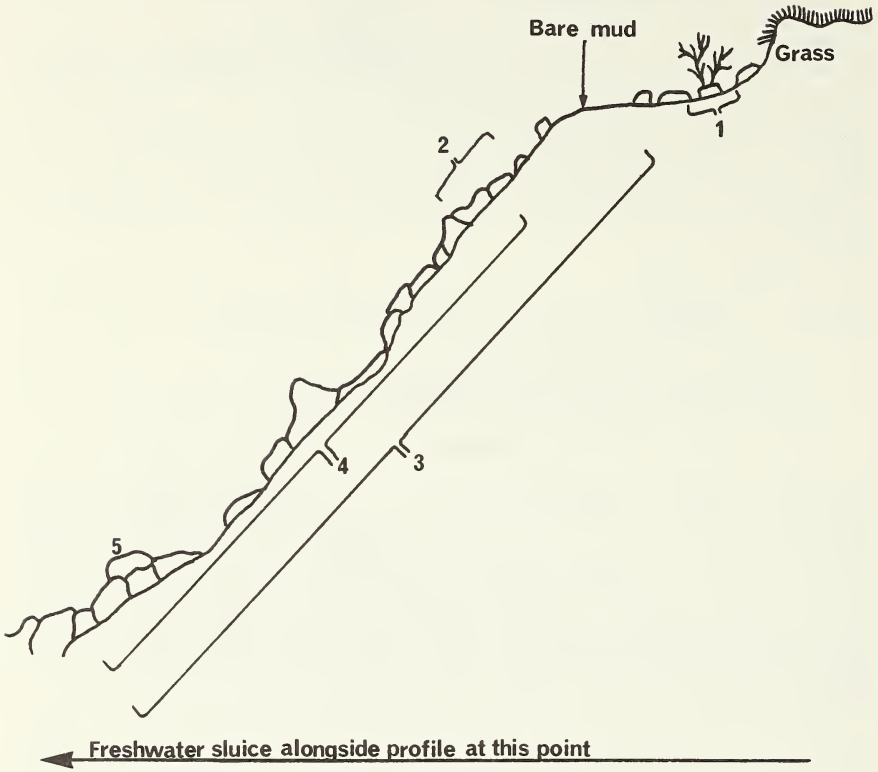


Fig. 5. River Nene, Stn. T, Profile B. The important area of higher level consolidated blocks at Sluice Road (TF/489234) with, *inter alia*, *Fucus spiralis*. Semi-diagrammatic; not scaled.
1. = Twigs purposely buried in mud; a few small blocks present. Both blocks and twigs carry good *Blidingia*.
2. = *F. spiralis* in fruit; epiphytic *Elachista fucicola*
3. = *Enteromorpha compressa/intestinalis*
4. = *Fucus vesiculosus* scattered throughout; mostly fruiting
5. = Few *Mytilus edulis*.

(TF/468182), inland to North Side (TL/275994), slightly less than 9 km east of Peterborough. The most important reach here is that from Wisbech seaward to near Foul Anchor; principally this concerns only the true left (west) bank of the river, the right bank being largely in Norfolk. All our collections were made within the 2 km south of Foul Anchor. The only changes likely in floristics and distribution further into the river course than Wisbech involve a gradual reduction in salinity effects and thus loss of the marine character of the benthic flora. The reach seaward of Wisbech is assumed to be representative of all the Nene's "marine coastline" and to carry the highest degree of marine influence in the benthic algal flora of the county. Even so, the reductions of saline influence and in

availability of artificial substrata are significant in comparison with full marine conditions on adjacent coastlines in the area, judging from the nature of the predominant Nene flora described below and listed later.

We examined principally the reach between TF/466177 and TF/465171. The Nene west bank there consists of steeply sloping mud bearing large stones irregularly at intervals throughout. Mostly, these stones occur in the lower half of the bank, although occasional patches reach to or near the bare mud below the wet fringe of *Agropyron*. Full-tide levels at spring tide periods probably lie just above the first flatter shelf of uncut Gramineae that abuts on the sloping bare mud and stones of the bank proper; the drift line at that level is continuous and quite dense, especially in *Fucus vesiculosus*, with *Ascophyllum nodosum* well represented. *Enteromorpha intestinalis* and *E. prolifera* spread over the levels from the lower *Agropyron* fringe down to low water level. Stones on mud at the level just below *Agropyron* carry *Rhizoclonium riparium*, with the narrow vertical level between *Agropyron* and *Rhizoclonium* being covered by *Blidingia marginata* and *B. minima*. Where occasional fence posts standing further down the bank attain the same level, they too carry *Blidingia* spp.

OTHER COLLECTORS' STATIONS, various dates as indicated

(a) *General:* **Lincolnshire**

Shore Stations

1a. *HUMBER* leg. Caton Haigh. From estuarine alluvium.

1b. *HUMBER* 1963. Hinton-Clifton (1964).

1c. *HUMBER* July 1969. Coll. N. Wallace.

2. *ALKBOROUGH* SE/8723. 1963. Hinton-Clifton (1964). Alluvial mud with scattered stones.

3. *OPPOSITE READ'S ISLAND* SE/9521. 1963. Hinton-Clifton (1964). Mainly mud.

4. *FERRIBY CLIFF* SE/9922. 1963. Hinton-Clifton (1964). Mainly mud with small chalk stones.

5. *BARTON* TA/0223. 1963. Hinton-Clifton (1964). Mainly mud and a few head-sized stones.

6. *NEW HOLLAND* TA/0724. 1963. Hinton-Clifton (1964). Mainly mud with stones.

7. *GOXHILL HAVEN* TA/1225 approx. 13.7.1970. Coll. Jukes. On stone embankment just below H.T.L.

8. *SOUTH KILLINGHOLME HAVEN* TA/1817. 1963. Hinton-Clifton (1964). Mainly mud with rocks and slag above M.T.L.

9. *IMMINGHAM* TA/1916. 1963. Hinton-Clifton (1964). Mainly mud with a large number of pier piles and some stones.

10. *GREAT COATES* TA/2412. 1963. Hinton-Clifton (1964). Mainly mud with some stones above M.T.L.

11. *GRIMSBY DOCK* Miss E. Bury Coll. [CAL].

12a. *CLEETHORPES* TA/3109. 1963. Hinton-Clifton (1964). Sand and mud with some gravel and rocks.

12b. *CLEETHORPES* Miss E. Bury Coll. [CAL]. Including specimens annotated "Cleathorpes [sic!] near Grimsby Dock Wall".

12c. *CLEETHORPES* as substrate for Polyzoa; probably drift. Vine (1892), repeated in Roebuck (1895).

13a. *TETNEY* TA/3505. 1963. Hinton-Clifton (1964).

13b. *TETNEY HAVEN* Probably 1957. Gray (1959).

14. *GRAINTHORPE HAVEN* TA/397010. 5.9.1970. Coll. Jukes. On wooden channel supports.

15. *SALTFLEET HAVEN* TF/470934. 6.9.1970. Coll. Jukes. Edge of the channel.

16a. *SALTFLEETBY* TF/470928. 5.7.1970. Coll. Jukes. On wreck of metal boat by Saltfleetby-Theddlethorpe Nature Reserve.

16b. *SALTFLEETBY* April/May 1973. Polderman (1974b). Saltings at Saltfleetby-Theddlethorpe Nature Reserve.

17a. *SUTTON ON SEA* 12.9.1970. Coll. Jukes. On breakwaters.

17b. *SUTTON ON SEA* TF/522822. July 1969. Coll. N. Wallace. On cement groynes.

18. *HUTTOFT BANK* TF/543786. 9.8.1970. Coll. Jukes. On breakwater.

19. *ANDERBY CREEK* TF/552758. July 1969. Coll. N. Wallace.

20a. *GIBRALTAR POINT* TF/564580. July 1969. Coll. N. Wallace. On sand, near low water level.

20b. *GIBRALTAR POINT* TF/555576. February and June 1962. Stewart and Pugh (1963). The New Marsh.

20c. *GIBRALTAR POINT* April/May 1973. Polderman (1974b). Seldom immersed brackish marsh.

20d. *GIBRALTAR POINT* 1973/4. S. Coles.

21a. *WAINFLEET* TF/515554. 1973/4. S. Coles.

21b. *WAINFLEET* TF/501538. 1973/4. S. Coles.

21c. *WAINFLEET* TF/4952 approx. 1973/4. S. Coles.

22. *WAINFLEET RANGES* on and near target-markers. TF/5352. 1973/4. S. Coles. Target-markers are permanent concrete structures surrounded by fairly deep scour-pools.

23a. *HORSESHOE* TF/471509. 1973/4. S. Coles.

23b. *HORSESHOE* April/May 1973. Polderman (1974b); "near Horseshoe".

24. *OUTER MUSSEL BEDS* TF/4847 and 4746. 1973/4. S. Coles.

25. *SAILORS HOME, LOWER MARSH* TF/4548. 1973/4. S. Coles.

26. *FREISTON SHORE* TF/401426. 1973/4. S. Coles.

27. *FRAMPTON* TF/3638. 1973/4. S. Coles.

28. *HOLBEACH* TF/412340. 1973/4. S. Coles.

29. *GEDNEY DROVE END* TF/480283. 1973/4. S. Coles.

30. *RIVER NENE* 1973/4. S. Coles.

31. *NENE MOUTH* TF/501263. 1973/4. S. Coles.

32. *TOFT SAND* 1973/4. S. Coles.

Offshore Stations

33. *N.E. DOCKING BUOY*, 14 miles NE Skegness, 53°15′00″N 00°42′00″E. 26.2.1970. Coll. Trinity House.

34. *OUTER DOWSING SHOAL*, near L.V.I. *Victoria County History, Lincolnshire*: Marine Zoology MS.

(b) *Skrimshire and Relhan collection stations:* **Lincolnshire and Cambridgeshire**

Labelling of traced material, and/or data, attributable to Skrimshire is not entirely consistent, so that grouping of records with slight geographical variation has been necessary to avoid proliferation of station numbers. We recognise the following distinct stations ("Wisbeach" or "Wisbech" as on the specimens concerned):

I. HOLBEACH SALT-MARSHES. No date. Skrimshire specimen.

II. Ebb-tide pools on salt-marshes, salt water ditches, or salt-marsh creeks at LONG SUTTON WASHWAY, below Wisbeach. Some records dated to 1797. Skrimshire specimens.

III. a. Creeks in TYDD MARSH. Skrimshire. (Relhan 1820).
b. TYDD MARSH. Skrimshire. (Turner & Dillwyn 1805; Relhan 1820).
c. TYDD MARSH, Cambridgeshire. Skrimshire. (Greville 1830; Harvey 1946). All above records undated.

IV. RIVERSIDE below WISBECH. Not dated. (Relhan 1788; 1820).
KINDERLEY'S CUT side, below [WISBEACH], 1795. Skrimshire specimen.
WASHWAY below WISBECH. No date. Skrimshire specimen.

V. a. Sluices (1797); marshes, in ebb-tide pools (1795; 1797); creeks in salt-marshes (1795); and salt-water ditches (1797), [BELOW] WISBEACH. Skrimshire specimens, perhaps also Turner collections.
b. NEAR WISBECH. Skrimshire. (Turner 1802).

VI. a. WISBECH, Skrimshire. (Turner & Dillwyn 1805; and specimens via Turner in Herb. Hooker), and WISBEACH RIVERSIDE, Skrimshire. (Relhan 1820).
b. WISBECH, 19.12.1828. Berkeley in Herb. Griffiths.
c. WISBEACH, on posts in the river. Skrimshire. (Relhan 1820).
d. WISBECH. Lewis Weston Dillwyn's Algae. Specimen with data and collector uncertain, but from same era as (and possibly collected by) Skrimshire.

These sites are arranged in order north-west to south-east across the Holland area of Lincolnshire and into Cambridgeshire, the then inner coastline of The Wash. Apart from inconsistencies in labelling, there are difficulties of exact relocation of the Skrimshire stations and this is the primary reason for their segregation into this separate section. The very considerable environmental changes that have occurred during the past three hundred or so years in this general area, and the variable application of place names are the main sources of the difficulties. The position, form, and extent of embankments, sluicing, and outfall workings have all been significantly and sequentially changed from time to time over the period since about 1650. Kestner (1962) and Steers (1964) have dealt fully with the various aspects; the few details presented here are related only to the positions of Skrimshire's collecting stations.

Specimens derived from Holbeach salt-marshes *(I)* do not bear dates, but it is reasonable to assume that the earliest date is likely to be 1795 in view of data from other specimens. Most of the area immediately seaward of the present town of Holbeach was amongst that land subject to early reclamation in the period about 1660 (Wheeler 1897). Seaward again, another fairly wide strip of land terminates in the embankment of 1793; this is still the inner boundary of undisturbed saltings in two narrow strips within the area referred to as Holbeach Flats, although to seaward along most of the 1793 embankment length, further embankments were constructed in 1838 and 1948. Collections by Skrimshire in 1795 thus probably were made somewhere along the marsh-area, now farmland, lying between the 1793 embankment and the 1838/1948 outer embankments, in the stretch between Fosdyke Wash and Fleet Haven Outfall. The 1793 embankment is that one easily identified on the current 1:50000 O/S sheet 131, running just seaward of Lundy's Farm (2 miles seaward of Holbeach St. Marks) and Lawyer's Farm (3/4 mile seaward of Holbeach St. Matthew). Kestner (1962, Fig. 7) has clearly illustrated the general situation.

The inflow channel to which the name Long Sutton Washway *(II)* was applied by Skrimshire is enigmatic; it could have been Lutton Leam, a stream that outfalls to the mouth of the Nene Outfall Cut and is now sluiced, or it could have related to a stretch of the Nene Outfall Cut itself. The larger part of Lutton Leam, a sizeable stream, lies in an area subsequently reclaimed after 1800, and the lower part of the Nene Outfall Cut is an 1830 extension to the earlier (1773) primary cut (see later), so that there is correlation in time with the marine collections in both cases. Up to about 1830, at least, the sea would have advanced

about a mile further inland, to the west of the Nene, beyond the position of the Old Lighthouses at the present Cut mouth. The general area around Leamlands, at the seaward end of Lutton Marsh, is certainly the *area* of marshes referred to by Skrimshire.

Although the county name Cambridgeshire is occasionally *(IIIc)* used in connection with records from "Tydd Marsh" *(III)*, the extent to which this location relates to that county is uncertain on grounds both of boundary positions and (principally) application of the location name. The present Tydd St. Mary's Marsh, now isolated from marine influence by sluicing of the South Holland Main Drain and embankment of that area of the Nene, is wholly with Lincolnshire. The name "Tydd", however, occurs as part of many names within the immediate boundary areas of Lincolnshire and Cambridgeshire, and Skrimshire's collecting grounds in that early marshy area are not known with total certainty. If the available data are to be believed, the whole of the area to which the name Tydd Marsh could be applied was enclosed before 1700 (Kestner 1962, Fig. 2), in the 2-4 mile wide strip then reclaimed. It is possible that there remained some few small streams draining the areas landward of Sutton Bridge and still directly affected by tidal inflow to the extent that the land immediately adjacent to them could still carry *Halimione* and its often associated *Bostrychia*, together with *Ulva lactuca*. The latter are the species to which the location "Tydd Marsh" was applied. The only *Bostrychia* material attributable to Skrimshire is localised no more precisely than as from "Wisbech" or "on the marshes below Wisbeach". Similarly, *Ulva lactuca* specimens in the Skrimshire collection are recorded as from "the Salt-marsh at Long Sutton Wash", "the Washway below Wisbeach", and "the Salt marshes below Wisbeach", without any mention of Tydd Marsh. The earliest traced mention of "Tydd Marsh" in connection with Skrimshire's *Bostrychia* seems to be that in Turner and Dillwyn (1805), although in 1802 Turner had merely reported the species as "near Wisbech, Mr. Shrimshire [sic!]". Unless the information was passed by word of mouth from Skrimshire to Turner, the later statement may be unjustifiable. We have assumed "Tydd Marsh" to relate approximately to the area enclosed today by the A17(T) in the north, the A1101 on the west, the North Level Main Drain in the south, and the Nene itself in the east. It is therefore considered to have involved only Lincolnshire, not Cambridgeshire.

The three remaining stations concern principally the Nene around and immediately to seaward of Wisbech, which has been taken to include the stretch to Foul Anchor; mainly, this involves Cambridgeshire, but since the seaward confines of "below Wisbech" in its various forms, with the known inconsistency of labelling, cannot be wholly certain, all records that include those words are attributed to both counties. The river itself and its banks, below Wisbech, are included as Station *IV*. "Washway" was a term much used by Skrimshire for major drainage channels, and here relates to the Nene. "Kinderley's Cut" is the name by which the original 1773 training of the river outfall was long known. Relhan (1820) scrupulously acknowledged Skrimshire as the source of all his data, except in the case of *Fucus vesiculosus*. Relhan (1788) lacked the Skrimshire data but presented exactly the same *F. vesiculosus* as in 1820; that record may reasonably be assumed to derive from Relhan's (or Martyn's; *cf* Price and Tittley, 1975) own (undated) observations or collections. All other channels or still saline areas lateral to but connecting with the main saline water penetration through the Outfall Cut below Wisbech are placed as station *V*, whereas the town itself, its riversides, and structures within the river channel there are attributed to *VI*. Here, for convenience, are included small numbers of collections of Berkeley, perhaps by Dillwyn (unlikely), and perhaps by Turner (more likely, in view of his many years in Yarmouth, Norfolk).

(to be continued)

THE DISTRIBUTION OF UNPIGMENTED AND PIGMENTED *GAMMARUS PULEX* L. IN TWO STREAMS IN NORTHERN ENGLAND

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The common freshwater shrimp *Gammarus pulex* L. has frequently been recorded from subterranean waters in Britain (Hazelton, 1972), where specimens are often pale in colour (Hazelton and Glennie, 1962). Little published information is available regarding the occurrence of such pale individuals above ground. During the course of an investigation into the light responses of this species, a study was made of the relative abundance of unpigmented and pigmented forms along two streams of the Ingleborough area in Yorkshire, Fell Beck and Clapham Beck.

Fell Beck, the main drainage channel for the southern side of Ingleborough Hill, descends the pothole Gaping Gill Hole in a spectacular cascade over 100 m high. A substantial part of the water passing underground contributes to Clapham Beck (Ford, 1975), which issues from a small cave, Beck Head, 1.5 km away. Close to its origin Clapham Beck receives a small input from a stream draining Ingleborough Cavern, 1.1 km from the cave mouth it receives another tributary draining Ingleborough Hill, while 1.3 km from the source a further small contribution comes from Cat Hole Sike. Clapham Beck has been dammed 1.8 km from its source to form a lake 500 m long from which water spills down a series of waterfalls into the length of stream that runs through Clapham village.

A total of thirteen stations along Clapham Beck and Fell Beck (the main channel and its tributary, Green Hill Sike) were sampled during four visits in 1976 (Table 1). The abundance of *G. pulex* was estimated by hand collecting from bryophyte cushions for half an hour or an hour depending on numbers at each station. Two easily separable categories were distinguished; individuals of pale yellowish-orange colour, here referred to as unpigmented, and others ranging from very pale grey to dark grey-brown, referred to as pigmented. On 18th August, after a prolonged period of dry weather when the stream level was low, samples were taken at the cave mouth, 50 m and 100 m downstream, under the first bridge downstream of the Clapham Lake waterfall (station 11b) and 10 m above and below the bridge (stations 11a and 11c). The water was high on 16th October after a long period of wet weather and only stations 9, 10 and 11 were sampled. On 19th October samples were taken at the junction of Green Hill and Wet Weather Sikes (station 3) and 100 m upstream along Green Hill Sike, but continuing wet weather prevented effective sampling of the cave mouth. By 28th October, after a short dry spell, it was possible to take a sample at this station, together with stations 1, 4, 5, 7 and 8.

The results in Table 1 clearly indicate that there is a substantial population of unpigmented *G. pulex* in Clapham Beck but not in Fell Beck. This is consistent with the source of the epigean population being a reservoir of unpigmented animals in the underground waters of Ingleborough Hill. Patchett (1960) recorded a "shoal of albino shrimps" inside Beck Head Cave, approximately 200 m from the point at which the stream emerges above ground. We have found unpigmented specimens to be abundant deep inside Ingleborough Cavern, collecting 80 individuals in an hour 600 m from the entrance.

Muller (1963, 1966) and Elliot (1965, 1971a) have shown that downstream drifting is a normal part of the behaviour of *G. pulex* and that such migration is greatest at night or under artificially reduced illumination. Displacement downstream by drifting is made good by upstream migration (Elliot, 1971b). Drifting may partly account for the movement of unpigmented animals out from underground, but no doubt flooding also contributes, especially in autumn and winter.

The proportion of unpigmented individuals declines downstream from the cave mouth, although it is still a substantial component 1.9 km away. One possible cause of the decline is the repigmentation of unpigmented animals. Hazelton and Glennie (1962) noted that *G.*

pulex becomes pale underground but recovers its pigmentation in the light. However, when unpigmented specimens from 600 m inside Ingleborough Cavern were kept together with pigmented specimens from Clapham Beck under the same conditions of moderate illumination in the laboratory, and supplied with plentiful food in the form of deciduous tree litter, the two forms were clearly distinct in colour at the end of six months (Piearce, 1975). The population at the Ingleborough Cavern site consists of pale yellowish-orange animals, together with a small proportion of pale grey individuals similar in colour to the palest pigmented specimens found above ground. It is tempting to suggest that the former are permanently depigmented while the latter, having entered the cave from outside and become bleached in the process, retain the ability to develop pigmentation on return to epigean life. The existence of permanently depigmented animals is consistent with the lack of individuals of intermediate colouration in Clapham Beck, and also the presence of a substantial density of the unpigmented form 1.9 km form the cave mouth, below Clapham Lake.

Table 1. Distribution of *Gammarus pulex* along Fell Beck and Clapham Beck determined by hand collecting from bryophyte cushions for half an hour (asterisked) or an hour.

	Station		*Length of stream sampled* (m)	*August 1976* nos/hr.	% un-pigmented	*October 1976* nos/hr.	% un-pigmented
1	1600		5			206*	0
2	1500	m. above	5			107	0
3	1400	Gaping	5			20	0
4	500	Gill Hole	5			2*	0
5	150		10			0*	0
6	2		5	160*	86	10	90
7	15		5			75	16
8	25	m. below	5			47	4
9	50	Beck	5	48	29	50	22
10	100	Head	5	52	23	13	38
11a	approx.		2	154*	13		
11b	1900		2	102*	8	65	5
11c			2	94*	15		

National Grid References: 1 = SD/752742; 2-5 = SD/751727; 6-10 = SD/754711; 11 = SD/745694.

It is possible that unpigmented specimens are at an ecological disadvantage relative to pigmented specimens in the epigean environment, and that for this reason the unpigmented form comprises only a small part of the total *G. pulex* population except at the cave mouth. Physical conditions outside the cave will be much less constant than within (e.g. water temperatures at stations, 6, 9, 10 and 11 were 9°C, 10°C, 12°C and 16.5°C respectively on 18th August compared with a uniform 8.5°C on 28th October) and the food supply different in quality and quantity. Unpigmented specimens are far more conspicuous against the dark green background of bryophytes than pigmented specimens, and are perhaps at greater risk from sight-hunting predators. Trout (*Salmo trutta* L.) are present in Clapham Beck and it is known that *G. pulex* can be a major food source for these fish (Maitland, 1965).

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A LINCOLNSHIRE ROSE PROBLEM

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Woodruffe-Peacock in his "Catalogue of Lincolnshire Plants" (*Naturalist*, 1894, p. 261) gives:

> *Rosa sepium* Thuill. (*R. agrestis* Savi). Var. ? From Swinderby to Thorpe-on-the-Hill, 1892. North Scarle, 1893. Both Mr. H. Fisher, and in his Herb. Teste Revs. E. F. Linton and W. Moyle Rogers. The former writes to Mr. Fisher: 'A remarkable variety — a long way from type. Very near a form which the Rev. E. S. Marshall has taken me to see near Wibley, Surrey.'

In an attempt to refind this rose, I spent an hour or so on 12th July, 1971 searching the hedges from Thorpe-on-the-Hill towards Eagle and Swinderby about three miles S.W. of Lincoln. Eventually I found and sampled a bush which appeared to have some affinity with *R. agrestis*. I was then on my way north to Durham and had no further time to investigate. Discussing this specimen with the Rev. G. G. Graham on the following day, we decided that since the pedicels were slightly glandular it could not be *R. agrestis*, and we finally concluded that *R. coriifolia* var. *paicheana* R. Kell. was the nearest name for it, though the styles and orifice were not right.

A few weeks later I returned with Mr. Graham to the site to make a more thorough examination. The rose was in a hedge of considerable age. If Max Hooper's formula applies

(see: *Area*, 3, 63-5 (1970) it must date from the Norman Conquest — ten species of shrub were evident in the first dozen yards: *Corylus avellana*, *Ligustrum vulgare*, *Lonicera pericylmenum*, *Populus tremula*, *Prunus spinosa*, *Quercus robur*, *Rosa* spp., *Rubus fruticosus* and *Viburnum opulus*, with *Fraxinus excelsior*, *Rhamnus catharticus*, and *Salix atrocinerea* a little further down. *Rosa canina* and *R. dumetorum* with *R. arvensis* vars. *vulgaris* and *ovata* were all frequent and this glandular rose was to be found every few yards over the 200 yards or so of the hedge.

The hedge is in Eagle parish on the back road from Thorpe-on-the-Hill to Swinderby (grid ref. 43/887663), and so agrees with Fisher's description of his 1892 site. The number of bushes of this particular rose would indicate a long-standing existence, widespread enough not to be easily missed by Fisher when walking between the two villages.

There was very little evidence of glands on the pedicels of the flowers which I examined on 12th July. In fact I did not see any until examining the specimen (247/12.7.71) the next day. However, Borrer's description of *R. sepium (agrestis)* in *English Botany* Supplement 2653 does not exclude these glands, despite Wolley Dod's interpretation in his *Revision of British Roses* (1931). Syme too, in *English Botany* 3rd Edition vol. 3. p. 212 gives it 'a few gland-tipped acicles' on the pedicels. (N.B. *Flora Europaea*, (1968) also says 'pedicels sometimes sparsely stipitate-glandular'); so it might well have been identified as *R. sepium* in 1892.

When sampling the bush at flowering (247/12.7.71), it was marked and on returning in August only one fruit remained and that brown, withered and about to fall. Its sepals were reflexed. All other flowering stems on it ended in stumps from which the fruit had dropped.

Most of the bushes in this length of hedge were examined in August and although there were many similar bushes no others with abortive fruit were found. It was noticed that there was considerable variation in the amount of glandulosity of both the stems and pedicels. There was one bush in which this was so marked as to recall *R. arvensis* var. *gallicoides*, with most of the subfoliar glands red-tipped but a few greenish white. My sense of smell is poor, but Mr. Graham thought he noticed a slightly sweet smell from the crushed young leaves.

It seem reasonable to suppose that these bushes represent Fisher's off-beat *R. agrestis*, but granted that, what do we call them? The leaflets were mostly narrowed at the base which suggests *R. agrestis*, though a few could be found which were rounded below. On the whole Sowerby's plates for *R. sepium* (Ed. I 2653; Ed. II 714; Ed. III CCCCLXX) agree quite well with these bushes though the fruits are broader than Sowerby's and the pedicels much shorter.

The more or less glandular pedicels fit *R. micrantha* better than *R. agrestis*, though, as shown above this character does not entirely rule out the latter. The acicular development on the branches, the very sparse sub-foliar hairs and the size of the flowers are against *R. micrantha* and so is the generally narrow shape of the leaflets. The hispid styles and glandular stems do not fit *R.* x *latens*, though other characters are quite in accord with this taxon.

In the intervening period since these observations were made some closely related roses have been noted in the limestone area about Stamford; at Barnack (53/040941), Bainton (53/109036), Kingscliffe (42/996964), Casterton (several bushes) (53/016093) and Stamford itself (two bushes) (53/020070). The plants at Casterton have sepals rising to the horizontal before falling, and can be classified under *R.* x *latens* while the others with reflexed sepals are probably better under *R. latebrosa*. A study of these bushes and a re-examination of the niches where they might be classified in Wolley-Dod (1930) leads one to the conclusion that we are dealing with a set of hybrid roses, of probable parentage *R. canina* x *rubiginosa*. Most of the roses described by Wolley-Dod as 'varieties' within the Group Caninae-Scabratae would also be better considered as differing forms of *R. canina* x *rubiginosa*.

Here then is the answer to the difficulty in matching up many varietal descriptions with actual bushes in the field, and herein lies the probable solution to our original problem. Fisher's rose from the Swinderby hedgerow is very similar, yet different in a few respects from a number of taxa which we have considered: it is no doubt another member of the *R. canina* x *rubiginosa* complex.

CITY OF BRADFORD METROPOLITAN COUNCIL NATURAL SCIENCES COLLECTIONS: PART 1 — BOTANICAL

MARGARET M. HARTLEY

Keeper, Natural Sciences, City of Bradford Metropolitan Council Museums

Following local government reorganisation in 1974, the herbaria at Cartwright Hall, Bradford (CMM) and Cliffe Castle, Keighley (KGY) were united to form a reference collection for the City of Bradford Metropolitan Council Museum Service, at present housed at Cartwright Hall, Bradford (the long term hope is of finding space for it with the other Natural Sciences reference material at Cliffe Castle, Keighley).

The basis of the former Bradford (CMM) material is the Herbarium of F. Arnold Lees (1847-1921) acquired by Bradford Corporation in 1906. His later material is now in the British Museum (Natural History). Bradford's purchase included Lees' collection of books (among them 50 to 60 floras) and leaflets, many annotated by him, which are stored at the Central Library, Bradford (details in Catalogue, 1909). The Lees' Herbarium of an estimated 25,000 cryptogams and phanerogams consisted of a "British herbarium" arranged in 1935 according to the 11th edition of "The Catalogue of British Plants" (1925) by M. Longbottom (1898-1946), a former Keeper at Cartwright Hall (there is a marked copy of the Catalogue showing the species present and number of specimens); various localised collections (Table 1); small herbaria that Lees had acquired from others (Table 2a); boxes of mainly unmounted "accretions" of various dates, collected by Lees and others; and collections of non-British material (Table 4).

Table 1 F. A. Lees Localised Collections

Area	Dates	Approx. no. species represented
Lincolnshire Flora	1878/9	150
Worcestershire	January to April 1883	100
Berkshire & Oxford	June to October 1883	60
Wensleydale Flora	1884/5	300
Harrogate district & Nidderdale Flora	1893	60

This storage system necessitated searching through several different storage boxes for all specimens of a given species. As other local herbaria had been acquired by Bradford after the Lees' herbarium (Table 2a), a decision was taken in 1969 to rationalise the storage and integrate all the British phanerogamic material, after making lists of specimens in the various local floras and clearly indicating the source on the sheets, and store it according to Dandy (1958). Though a considerable amount of Lees' herbarium was collected by himself, many other botanical collectors of his day are represented, and it is hoped to compile a list of contributors, if not a complete catalogue of the collection, in the future. All new British material is now placed in this system, with a clear indication on each sheet of the source of the material.

As Lees' herbarium contains a reasonable amount of European and North American material, this is to be stored along with all foreign and cultivated material (Table 4), including aliens not in Dandy (1958), in a separate system from the British. No work has yet been done on this.

The Lees' cryptogamic material (lichens, liverworts and mosses), which is almost entirely British, was in very poor order, but by 1970 M. R. D. Seaward had reorganised the lichens, checking determinations where necessary and bringing nomenclature up to date (Seaward 1968, 1970, 1973). Similar work on the bryophytes is progressing slowly. The majority of the lichens and bryophytes are stored in packets in a card-index type drawer system, according

Table 2a British Herbarium (CMM)

Collector of Herbarium (biographical dates)	Source, or method of acquisition	Approx. no vascular plants	Approx. no. non-vascular cryptogams	Period of collection	Collecting area
Dr. Frederic Arnold Lees (1847 — 1921)	From Lees by purchase 1906	20,000	4,000	1838 — 1906	Britain; also Europe and America (Table 4)
T. D. A. Cockerell	F. A. Lees	123	—	1875 — 1877	V.C.'s 2, 4, 10, 11, 16
Dr. J. Deakin Heaton (1817 — 1880)	Purchased by Lees in 1894	120	—	1843 — 1880	Leeds area V.C.'s 63, 64
Henry Whaley (fl. 1838 — 58) including H. Ibbotson (1816 — 86) & some J. D. Heaton	Given to Lees, 1884	113	a few	1838 — 1858	Yorkshire and V.C. 90
E. J. Lumb	Not known; perhaps Lees	1,250	—	1887 — 1889	West Yorkshire (V.C.'s 63, 64) and Devon
Dr. John Willis (fl. 1873)	Not known; perhaps Lees	412	—	1864 — 1871	V.C.'s 16, 20, 25, 62, 63, 64, 66, 69, 70
Joseph Collier of Sheffield	From Miss Cockbain in 1913 (CH.10.13)	2 vols. 15″ × 20″ 2 vols. 8½″ × 12″	—	1782 or 1787	No data
British Marine Algae		—	2 vols. 14″ × 17″	—	No data
John Clayton (1847 — 1934) — but none collected by J. Clayton	Gift to museum in 1939 (NH.7.1939)	1,264	—	1880 — 1888	British, very few Yorkshire
Harry Dibb (d. 1948)	Gift to museum in 1955 (G.7.55)	150	a few	1938 — 1947	Scottish mountains, Cartmel & Boot
Douglas Vaughan	Gift to museum in 1968 (NH.36.1968)	457	—	1956 — 1959	Mainly Bradford area
Sidney Jackson	Gift to museum on retirement as Keeper (NH.55.1972)	60	—	1936 — 1938	Mainly Bradford area
Rev. A. B. Holmes	Gift to museum in 1974 from I. T. Fisher who had it from the Rev. Evan James of Thornbury, Herefordshire	150 species	—	1909 — 1933	V.C.'s 5, 6, 15, 16, 29, 33, to 37, 40, and N. Wales
Joseph Beanland (1857 — (1932)	ON DEPOSIT ONLY	2,000	—		Britain, many Yorkshire

Table 2b British Herbarium (KGY)

Collector of Herbarium (biographical dates)	Source, or method of acquisition	Approx. no. vascular plants	Approx. no. non-vascular cryptogams	Period of collection	Collecting area
Joseph Beanland (1857 — 1932)	Not known	300	—	1891 — 1894	Britain
John William Carter (1852 — 1920)	Purchased from executors, 1923	4,000	—	1878 — 1910	Britain, mainly Yorkshire V.C.'s 63 and 64
William Driver	M 1185	2 albums (little data) 46 sheets with data		1890 — 1920	V.C.'s 63 and 64
Alexander Graham) (d. 1878)	M 259 from Isabella Graham (née Laycock) c. 1884	3,000 on 917 sheets		1857 — 1859	Scotland
Thomas Hebden (1849 — 1931)	Hebden's executors Jan. 1931	—	3,408 Lichens, of which approx. 1,650 are British	1890 — 1930	Britain (especially Keighley & Yorkshire); also Europe, America, etc. (Table 4)
E. C. Horrell	M 277	—	58 Sphagna	1901	Teesdale
George Severs	M 278 acquired in 1913	16	—	1873 — 1874	"Rare local plants", Keighley area
Abraham Shackleton (1831 — 1916)	M 279 acquired 1916, gift from Mrs. Lister (his daughter)	300	420 Lichens 200 Bryophytes	Vascular plants: 1814 — 1845 (by an earlier A. Shackleton) Cryptogams: 1814 — 1914	British: mainly V.C.'s 63 and 64
Matthew B. Slater (1829 — 1918)	M 915 acquired in 1938	—	36 Bryophytes	1870 — 1895	Yorkshire, Teesdale, Scotland & N. Wales
Alderman John Smith	Acquired in 1915	100	—	1877 (ferns)	Keighley
				1897 (phanerogams)	Arnside area (V.C.'s 60 and 69)
Walter Wardle	M 1211	200	—	1890 — 1916	North of England
General collection	Exchange material	—	750 Bryophytes		British

Table 3 Wakefield Art Gallery and Museum Herbarium (WKD)

Collector of Herbarium (biographical dates)	Source, or method of acquisition	Approx. no. vascular plants	Approx. no. non-vascular cryptogams	Period of collection	Collecting area
W. S. Banks	not known	300	—	1853 — 1862	Mainly West Yorkshire V.C.'s 63 and 64; also V.C.'s 25, 37, 49, 62, and 69
Thomas Waller Gissing (1829 — 1870)	perhaps via Algernon F. Gissing who added specimens after 1870	1,250 (30% without data)	—	1840 — 1897	Britain, especially V.C.'s 37, 59, 62, 63, 64, 69, 90
		31 Ferns (in volume entitled "The Fern & Fern Allies of Wakefield and its neighbourhood")	—	1852 — 1861	V.C.'s 37, 63, 69
T. W. Gissing, including specimens from J. H. Davies (150), H. Ibbotson, J. Nowell and J. Dugdale		—	500 Bryophytes	1833 — 1867	Mainly Yorkshire; also V.C.'s 37, 49 and 71
? A. F. Gissing		—	50 Algae	1880 and 1899	Northumberland
Collector unknown		—	60 Bryophytes & Lichens	1870	V.C.'s 70 and 71
F. P. M.	not known	—	100 Bryophytes	1852 — 1854	Very few with data
Moss Exchange Club	not known	—	600 Mosses	1890 — 1910	Britain
Sarah Anne Naylor and Hannah Elizabeth Wilkinson (née Naylor) (1810 — 1892)	perhaps given to J. Birks for Wakefield School of Art Museum about 1888 by S. A. Naylor (late of Warren House, Wakefield)	700 (35% without data)	—	1833 — 1884	Britain, especially V.C.'s 9, 10, 14, 15, 17, 22, 34, 37, 57, 59, 62, 63, 64, 70, 72, 73
Flintoft	Presented by Mr. G. Wassell, on 21 Nov. 1926	50 ferns	—		Lake District
William Gardiner, Dundee		1 volume of ferns	and mosses	1844 — 1848	Scotland
G. Parkin		50		c. 1912	No data

Table 4 Foreign and Alien Herbarium

Collector of Herbarium (biographical dates)	Source, or method of acquisition	Approx. no. vascular plants	Approx. no. non-vascular cryptogams	Period of collection	Collecting area
CMM					
T. W. Edmondson (d. circa 1937)	Presented to museum by T.W.E. during F. Rhodes curatorship	1,800 200	—	1895 — 1927 1894 — 1925	N. America & Canada Europe
F. Lacroix	F. A. Lees	600	—	1873 — 1874	France
John W. Reed	F. A. Lees	50 sheets, many specimens per sheet	—	1897 — 1898	Switzerland
Fred Rhodes (1862 — 1931)	Curator, Cartwright Hall Museum	1,000	—	1905 — 1910	Mainly Bradford aliens
William Todd	F. A. Lees	100	—	circa 1888	N. America (mainly New Jersey)
J. Whiteley	Gift to museum in 1913 (CH. 58. 13)	66 species	—	1900 — 1913	Mainly Bradford area
Flora Medica	Probably F. A. Lees, via J. D. Heaton	60	—	1840	Chelsea Botanic Garden
Ferns	Not known	50	—	—	No data
KGY					
Thomas Hebden (1849 — 1931)	Hebden's executors Jan. 1931	—	2,000 including: 749 818	1890 — 1930	World-wide North & Central America Switzerland

to the order given in current British Checklists. The collections of algae and fungi are few, and the majority of the algae are marine, without data.

Lees is best known for his "Flora of West Yorkshire" (1888), published through the Yorkshire Naturalists' Union and written with the aid of many leading botanists who often contributed plants to the herbarium as well as lists for the Flora. An edited "Supplement to Yorkshire Floras" was not published until 1941, utilising records that Lees had never had published. In 1892 he wrote an "Outline Flora of Lincolnshire", and he also contributed local floras for various parts of Yorkshire to local publications.

It should perhaps be pointed out that, though many of Lees' specimens are vouchers for entries in his Flora (1888), for some species there are also Yorkshire specimens for localities additional to those mentioned in the flora.

The basis of the former Keighley (KGY) herbarium is the Thomas Hebden (1849-1931) collection of lichens, drawings of lichens and fungi, books and manuscripts, described in some detail in 'A Guide to the Lichenological collection of Thomas Hebden" by M. R. D. Seaward (1971), available from Cliffe Castle, Kelghley, price 14p + 9p postage. A. Shckleton (1831-1916) worked with Hebden, and his small collections of lichens, mosses and a few flowering plants are also in the herbarium. The phanerogams at Keighley are mainly represented by 2 collections — a Scottish one by A. Graham and a British, but mainly Yorkshire, collection by J. W. Carter (1852-1920). Details of all the Keighley material are given in Table 2b.

Finally, mention should perhaps be made of the large plant gall collection of E. T. Connold, author of "British Vegetable Galls — an introduction to their study" (1901), and "British Oak Galls" (1908).

The Wakefield Museum Herbarium (WKD) of cryptogamic and phanerogamic material is now stored at Bradford on a "long loan" basis, and conservation and cataloguing work has recently been carried out on it. It is stored separately from the Bradford collections. The main collections are from W. S. Banks, S. A. & H. E. Naylor (later H. E. Wilkinson), and T. W. Gissing (1829-1870), detailed in Table 3.

Other botanical material consists of:

(1) a collection of seeds and fruits (mainly foreign)
(2) a collection of microscope slides showing anatomical features of Phanerogams and Cryptogams.
(3) a small working library of botanical books
(4) $2\frac{3}{4}$" slides, principally illustrating trees
(5) 35 mm colour slides of plants

Recent collecting for the herbarium has been practically non-existent due to conservation and storage problems, but these have now been resolved. Museum botanical records for the West Yorkshire area are kept on a 1 kilometre grid-square basis (in the West Yorkshire Biological Data Bank housed at Cliffe Castle). Such records are passed on to the Y.N.U. Tetrad Common Plant Recording Scheme, and as much recording as possible is carried out and encouragement of the activity given.

Any enquiries about the collections will be willingly answered where possible; and they are available to bona fide students for reference by appointment.

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AMPHIBIAN AND REPTILE REPORT FOR 1975

M. J. A. THOMPSON

For the 1975 Annual Report, I have received 262 individual records, compared with 222 for 1974. These records are analysed in the table below (the figures in brackets are for 1974):

	Individual	*10 km. grid squares for 1975*	*New grid squares for 1975*
Triturus vulgaris	26 (17)	19 (8)	8 (1)
Tr. cristatus	13 (8)	11 (7)	6 (1)
Tr. helveticus	15 (14)	13 (12)	6 (9)
Rana temporaria	95 (71)	45 (28)	11 (6)
Bufo bufo	56 (50)	32 (25)	11 (7)
Lacerta vivipara	22 (17)	16 (14)	3 (7)
Anguis frigilis	9 (14)	7 (9)	5 (2)
Vipera berus	14 (13)	9 (10)	3 (4)
Natrix natrix	14 (18)	7 (11)	1 (4)

Along with these 1975 records, I have also received a further 25 records for 1974 and 7 more for the years 1969/73. All these records have been sent to the Biological Records Centre at Monkswood.

The Sheffield City Museum invited the public to take part in a survey of the local amphibians in 1975, and data collected added a further 88 records of the Common Frog *(Rana temporaria)*, 24 records of the Common Toad *(Bufo bufo)* and 21 records of *Triturus* species. These Sheffield records are not incorporated into the overall 1975 figures (in the above table), but they do add two new 10 kilometre squares for the Common Frog and four squares for the Common Toad, to the Yorkshire totals since 1970.

Again, as in 1974, there have been no reports of alien species within the County. In spite of a warm dry summer, after a wet spring, there were more amphibian records than reptiles in 1975. The increasing recording of *Triturus* species was welcomed, especially as *Tr. cristatus* is thought to be dwindling in numbers. The new 1975 10 kilometre square records, as well as newly surveyed areas are listed as follows:

(1) Smooth Newt *(Triturus vulgaris)* Staintondale 54/09 and West Ayton 44/98 (Scarborough N.H.S.); The Batts, Colburn (P.R.) 44/29 north west of Pateley Bridge — 10 smooth newts — 44/17, Bogs Lane, Harrogate and Knaresborough Ringing Station 44/35, Farnham, Staveley and Burton Leonard 44/36 (all these records from Harrogate N.H.S.); Dronfield 43/37 and Whixlow Park 43/38 (Sheffield City Museum). Of interest; Pollington — many in ponds, ditches and marshes — 44/61 (C.A.H.); Barry's Lane Pond, Scarborough 54/08 (Scarborough N.H.A.) and Pallas's pond, Spurn Point 54/41 (M.L.)

(2) Great Crested Newt *(Tr. cristatus)* Richmond 45/10 (C.S.); Catterick district — found by local schoolchildren — 44/29 (P.R. and C.S.); Acklam 44/76 (C.S.); West Ayton — several present on 12/4/75 — 44/98 (Scarborough N.H.S.); Gallow Hill 44/35, Farnham and Burton Leonard 44/36 (Harrogate N.H.S.). Of interest: Skelton, York — 57 crested newts counted on 23/3/75 — 44/55 (M.J.A.T.).

(3) Palmate Newt *(Tr. helveticus)* Piercebridge 45/21 (C.S.); Stanwick and Forcett 45/11 (C.S.); Fadmoor 44/68 (C.S.); Speeton Cliffs 54/17 (Scarborough N.H.S.); Ben Rhydding — 26 palmate newts present 23/3/75 and Middleton Woods, Ilkley when 14 present — 44/14 (M.V.B.); Bogs Lane, Harrogate — 11 present on 26/3/75 — 44/35 (A.O'N. and Harrogate N.H.S.). Of interest: The Batts, Colburn — breeding in increasing numbers — 44/29 (P.R.).

4. Common Frog *(Rana temporaria)* Totley 43/27; Sheffield 44/10 (Sheffield City Museum); Grasswood Y.N.T. Reserve 34/96 and Barden Moor at 100ft. 40/05 (M.V.B.); Farnham — spawn noted on 21/3/75 — 44/36, Ramsgill 44/17 and Hartwith Mill 44/26 (Harrogate N.H.S.); Beilby 44/77 and Kilnwick 54/04 (E.H.W.); Old Mill, Masham 44/28 (P.R.) and Bempton 54/27 (via R.S.P.B. warden, Bempton). Of interest: Faceby, near Stokesley — numerous pairs in amplexus in domestic pond — 45/10 (D.H.A.); Pateley Bridge — a pond holding about 100,000 tadpoles under observation from 15/5/75 — 44/16 (Harrogate N.H.S.) and Langthwaite pond at 1000ft. with over 1000 tadpoles on 10/5/75 — 35/90 (M.J.A.T.).

(5) Common Toad *(Bufo bufo)* Starbottom district 34/97 and Beckermond Scar at 1000ft. 34/88 (M.V.B.); Staveley and Farnham 44/36, Bogs Lane and Gallow Hill, Harrogate 44/35 and Birk Crag 44/25 — breeding fair numbers at all these sites — (Harrogate N.H.A.); Skeffling 54/31 (D.W.); Kiplingcotes Y.N.T. Reserve — breeds most years — 44/94 (M.F.N.); Hull 54/13 (M.W.); Bempton Cliffs and Flamborough Head 54/27 (via R.S.P.B. warden, Bempton); Hellaby, Maltby 43/59 (W.E.) and Sheffield 43/29 (Sheffield City Museum). Of interest: Dubbs, Ripon Parks, thousands of small toads counted migrating from water on 23/6/75 — 44/37 (D.Mc.A. and C. Slater); Crosscliffe Lake — hundreds of small toads seen leaving the lake on 12/8/75 — 44/89 and Throxanby Mere 919 toads killed on roadside between 7/3/75 and 12/3/75 — 54/08 (Scarborough N.H.S.) and Moorlands Y.N.T. Reserve — several seen throughout the year on the Reserve — 44/55 (M.J.A.T.).

(6) Common Lizard *(Lacerta vivipara)* Stang Forest, Arkengarthdale at 1500ft. 45/00 (P.O.); Moor Lane, Middlesmoor 44/07 (Harrogate N.H.S.) and Faceby 45/50 (C.S.). Of interest: Potteric Carr Y.N.T. Reserve seen regularly June to August 44/50 (C.A.H) and Spurn Point Y.N.T. Reserve 54/41 (M.L., W.E.)

(7) Slow Worm *(Anguis fragilis)* Masham 44/28 and Forcett 45/11 (C.S.); Cayton Bay 54/08 (Scarborough N.H.S.); Cottingham and Hull 54/03 and Sutton on Hull 54/13 (E.H.W.).

(8) Adder *(Vipera berus)* Ampleforth 44/67 (C.S.); Hackness and Sawdon 44/98 (Scarborough N.H.S.) Faceby 45/50 (C.S.). Of interest: Viners, Denaby — known from this area up until 1950's — 43/49 (C.A.H.).

(9) Grass Snake *(Natrix natrix)* Bridestone Y.N.T. Reserve — in a grass meadow next to the Reserve — 44/89 (C.I.M.). Of interest: from Oliver's Mount playing fields Scarborough may be an escapee — 54/08 (C.I.M.) and Pollington — described as abundant — 44/61 (C.A.H.)

Records were received from: D. H. Adams, M. V. Bell, Harrogate Natural History Society, C. A. Howes and Doncaster Museum Records, D. McAndrew, M. Limbert, C. I. Massey and Scarborough Natural History Society, M. F. Nethercote, P. Oldfield, T. H. Riley and Sheffield Museum Records, P. Robinson, C. Simms, C. Slater, S. Walsh, S. Warburton, E. H. Wear, D. Whiteley and Sorby Natural History Society, as well as my own.

REPORT OF THE CONCHOLOGICAL SECTION FOR 1975-76

A. NORRIS

Two successive long dry summers have kept the number of interesting records down to a minimum. The most important record over this period was the finding of a single live specimen of *Truncatellina cylindrica* (Fer) from Wentvale near Pontefract (NGR 44/501176). This record is due to the very keen observations of Dr. L. Lloyd-Evans, and is the first record of this species for the county in over 60 years. (*Naturalist*, 1976, 25-27). Dr. B. Colville recorded a new site for *Vertigo pusilla* Muller, another very local species in the county, from near Glaisdale in North Yorkshire (GR: 45/799045). These being the only

really important records of land and freshwater mollusca for the county found over the past two seasons.

Our knowledge of the marine mollusca however has been considerably expanded thanks to the work done on the sea slugs at Robin Hood's Bay by Mr. C. D. Todd and Dr. Claude Poizat. Their reports, which they very kindly let me have copies of, include a fairly large number of new species for the county. Their lists include two meiobenthic opisthobranch gastropods which live interstitially in the muddy sand. These two species *Microhedyle lactea* Harting 1930 and *Philinoglossa helgolandica* Harting 1932 are known in Britain from very few stations, and at our present state of knowledge are considered as very local, if under recorded.

FIELD NOTES

Ivy Lacebug in an Unexpected Environment

The Ivy lacebug (*Derephysia foliacea* (Fall.)) is an exquisite little insect with shining, transparent fore-wings. Although widely distributed in Britain it is a local species and in Yorkshire it has been recorded from three localities, only one of these (Harewood) being within the last fifty years. As its popular name suggests, it is associated with ivy and it was, therefore, with some surprise that on 31 July, 1976 Mr. A. Norris and myself discovered several specimens in the middle of Thorne Moors, where as far as we know, there is no ivy for miles! The bugs were found when we were sieving dry grass which was growing on ballast at the side of one of the narrow rail tracks which cross the Moors. With the Ivy lacebugs were several examples of another lacebug, the tiny *Acalypta parvula* (Fall.). This is a fairly common species which is normally found in short dry moss growing on cinders or sandy soil. Unlike the Ivy lacebug it was not, therefore, totally unexpected in the type of situation where we were collecting.

Although *Derephysia foliacea* is normally associated with ivy, our experience shows that this is not always the case. Subsequently I had the opportunity of consulting Butler's monumental work, (Biology of the British Hemiptera-Heteroptera, London, 1923), and read (p. 208), that the species is recorded from a wide range of habitats, including salt marshes (under *Chenopodium*), on *Chrysanthemum leucanthemum* in dry meadows (quoted by Gyllenhal as a foodplant), and even from a dead rabbit! As Butler's work is not readily available to many workers these days it is felt appropriate to draw attention to his comments which, together with our own recent experience, may encourage other collectors to look elsewhere than on ivy for this lovely insect.

Roy Crossley

Salicornia **at Spurn**

The current floral list for Spurn Point (Crackles, 1975) records only *Salicornia europaea* L. The presence of other species became evident in 1974 and 1975 but it was not until 1976 that suitable fresh specimens could be submitted for verification.

The extension along the Humber side of the Point of *Spartina anglica* C. E. Hubbard since the 1940's has been followed by accretion, with the establishment and spread, particularly within the last decade, of an extensive area of salt-marsh composed of *Puccinellia maritima* (Huds.) Parl. and associated halophytic species. This now extends from the Kilnsea foreshore to about half-way down the river side of the Point. Numerous plants of *Salicornia* are present and some also occur in the region of the creek associated with *Halimione portalacoides* (L.) Aellen in the marsh adjacent to the chalk bank.

Specimens collected in September and October, 1976, were submitted to Dr. D. S. Ranwell of the Institute of Terrestrial Ecology. They were then forwarded to Dr. I. K. Ferguson of the Royal Botanic Gardens, Kew, for confirmatory determination. The arrangement used here follows that of *Flora Europaea* (which does not distinguish between *S. lutescens* and *S. fragilis* of the second edition of *Flora of the British Isles*).

(i) *S. europaea* group

S. europaea L. is common in the upper levels of the salt-marsh and also occurs in the creek.

Some plants growing on drier areas at the sides of the creek were found, in September, to be completely dark red in colour (and, unlike the other plants, they had all died by mid-October). It was originally suspected that these plants would fall within the range of *S. ramosissima* J. Woods. Dr. Ferguson's opinion is that they may perhaps be only atypical *S. europaea* at the end of the range nearer to *S. ramosissima*. A re-appraisal of this group at Spurn is therefore desirable.

(ii) *S. procumbens* group

S. dolichostachya Moss is present throughout the salt-marsh from upper to lower levels being much more abundant in the latter.

S. fragilis P. W. Ball & Tutin is less common but more frequent in the lower than upper parts of the salt-marsh. It was also present in the creek.

Both of these are apparently new records for the area. The status of *Salicornia* in other parts of the estuary has not been examined. Mr. E. Chicken (pers. comm.) reports the finding of plants which he considered to be *S. ramosissima* on a mud bank at Stone Creek on 28.10.1972.

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Clapham, A. R., Tutin, T. G. and Warburg, E. F. (1962). *Flora of the British Isles*, pp. 285-289. Cambridge University Press.

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K. Fenton

Plant Galls Found at Fishlake

Well over a dozen galls were noted during the Yorkshire Naturalists' Union excursion to Fishlake, near Doncaster on 13 July 1976, but many of these are common ones for the area; examples included *Phytomyza ilicis* Curt. on *Ilex aquifolium*, *Psyllopsis fraxini* L. on *Fraxinus excelsior*, *Diplolepis rosae* (L.) and *D. eglanteriae* Hartig on *Rosa canina*, and *Pontania pedunculi* (Hartig) on *Salix caprea*; gall-midges included *Dasyneura fraxini* (Kief.), *D. crataegi* (Winn.) and *D. ulmariae* (Bremi.), and gall-mites included *Eriophyes galii* Nal. on *Galium aparine*, *E. similis* Nal. on *Prunus spinosa*, *E. macrorhynchus cephalodes* Nal. on *Acer campestre* and an unknown *Eriophyes* on a garden *Acer*. Probably the best find of the day was a gall caused by a gall-wasp, *Phanacis hypochaeridis* (Kief.) on *Hypochaeris radicata* seen near the canal at Sykehouse.

T. F. Medd

BOOK REVIEWS

British Fungi Book 1 (Jarrold Fungi Series Book 1) with text and photographis by **E. A. Ellis**; Book 2 (Jarrold Fungi Series Book 2) as above, Jarrold & Sons, Norwich, 1976. 40p. each.

Two books which can without hesitation be recommended to anyone amateur, professional, beginner or not, naturalist, artist and photographer. Each book consists of four pages of introduction and fifty excellent full coloured photographs. Unlike many popular books which churn out the same group of species time after time the illustrations in Ellis' books are a mixture of common and widespread species, with rare or unusual species. Indeed some of the photographs are the only coloured illustrations the reviewers know outside the paintings accompanying the field notes, e.g. *Volvariella caesiocincta* and *Coprinus ellisii*.

Book 1 deals with agarics, boleti, some polypores, tooth fungi, jelly fungi and fairy clubs.

Book 2 covers puff balls and their allies, rusts, smuts, cup and flask fungi. Two true moulds, a hyphomycete and a myxomycete are also covered. The general introductions are useful and cover many aspects of fungal biology etc. in a short space. Each beautifully executed illustration is accompanied by a brief but informative caption.

The degree of sharpness is a credit to the publisher and photographer, and is demonstrated in many subjects by the glistening hymenium. *Hydnum repandum* is perhaps a little bright and *Mycena acicula* has suffered from reproduction problems but who cannot gasp at *Mycena belliae*, *Pleurotus ostreatus* with snow, etc.

How pleasing it is to see the smaller fungi given their rightful dues; so often in popular books they are included as a mere afterthought, but Ted Ellis proves how they can be just as photogenic as their larger kin.

Let us hope that these two little books prove to be such a success that more of Dr. Ellis' photographs and careful observations will embellish future additions to the British Fungi Series.

R.W. & B.J.C.

Medicinal Plants and their Uses by **Hans Flück** with the collaboration of **Rita Jaspersen-Schib,** translated from the German by **J. M. Rowson.** Pp. 188. W. Foulsham, London. 1976. £2.95.

It is good to have an English translation (with taxonomic revisions and some additional information) of Flück's useful book which provides colour illustrations supported by basic taxonomic descriptions to 152 medicinal plants. Each of the above entries takes up one page, so that the text is concise but informative, giving notes on their British habitat (only a few Swiss plants described are not to be found growing naturally in Britain), collection, constituents, actions and usage.

Introductory matter includes general information on the methods of preparing medicinal plants, the mode of action of major active plant constituents, and the collection (including a calender) and cultivation of medicinal plants. Additional information includes sections on teas made from indigenous plants, and a list of some ailments and the plants used in their treatment. An alphabetical *(sic)* index of English and Latin plant names, and a useful glossary (curiously placed after the index) are also provided. Units are expressed mainly in metric and imperial systems, but it is interesting to observe the continued use of the less-precise domestic measures, e.g. knifepointful, teaspoonful, handful, in medical practices.

The delicate outlines to the plates have reasonably faithful colour reproduction, but the type-setting, although clear, is rather off-putting (especially the double-column format with constant breaking of words at the end of lines); a few typographical errors have also been noted. Despite these disappointments, this book represents good value (I noted this same book at 3-4 times the price in a Finnish bookshop in August of last year!).

M.R.D.S.

John Anthony's Flora of Sutherland edited by **J. B. Kenworthy.** Pp. 201 with frontispiece and five photographic plates and two maps. Limp cloth cover: £4.00 post free: Obtainable from Botanical Society of Edinburgh, Royal Botanic Garden, Edinburgh, EH3 5LR.

Sutherland is a big county with a splendid coast-line and many impressive mountains separated by great areas of peat and rock. This account of the flora of the county — the first to be issued — has been prepared for publication following John Anthony's death shortly before its completion. There are chapters on the topography, geology, soils, climate and vegetation of the country, the history of its botanical exploration and the principal floral features of the thirteen parishes under which records are entered. There is also a very useful bibliography. In the main part of the Flora, 883 species are listed with habitat and frequency data followed by enumeration of the parishes from which records are known together with more precise localities for the rarer species. These include many which are largely or wholly restricted to Sutherland. Botanists will welcome the publication of this Flora of one of the most beautiful if most remote of British counties and future botanical visitors will find it an invaluable guide.

W.A.S.

Effects of Air Pollutants on Plants edited by **T. A. Mansfield.** Pp. x + 209, including numerous text figures, photographs and tables. Cambridge University Press. 1976. £8.50.

This multi-authored collection of nine papers, two appendices and an introduction is based on a Society for Experimental Biology Seminar held in the University of Liverpool on 10 April 1975. The approach of the volume is essentially directed to determining the effects of pollutants on metabolic processes. Although the papers are for the most part highly specialised, they do provide background introductory information and useful bibliographies, and together with the appendix 'An introduction to the chemistry of atmospheric pollutants', will prove of value to the biologist and environmentalist with a more general interest in air pollution. The major air pollutants of ozone, fluoride, sulphur and nitrogen dioxides, and heavy metals are treated in the papers, and the appendix 'Guide to the metabolic and biochemical effects of air pollutants on higher plants', which covers these major pollutants (except heavy metals) as well as peroxyacetyl nitrate, carbon monoxide and ammonia, will be a particularly welcome source of reference material.

M.R.D.S.

An Illustrated Key to Freshwater and Soil Amoebae by **F. C. Page.** Pp. 155. Freshwater Biological Association, Scientific Publication no. 34. 1976. £2.50.

A valuable aid for the zoological taxonomist or ecologist: detailed keys, with concise morphological descriptions, to more than 120 species reported mainly from Europe and North America are supported by many line drawings and photographs, and information on cultivation and ecology, together with a useful reading list, are also provided. In the words of the author, "this key will not necessarily make the identification of most amoebae easy . . . it will make the identification of many amoebae possible".

British Tardigrades by **C. I. Morgan** and **P. E. King.** Pp. iv + 133, including 88 line drawings. Synopses of the British Fauna (New Series) No. 9, The Linnean Society of London/ Academic Press. 1976. Softcover, £2.50.

A further contribution to this excellent series of identification guides to the British fauna. This book will do much to promote the study of these overlooked, but important, organisms which are to be found mainly in the surface water of bryophytes and lichens. The text contains useful introductory matter, keys, morphological descriptions with many line drawings, distributional data (including six maps), and a bibliography.

Insects and History by **J. L. Cloudsley-Thompson.** Pp. x + 242, with 35 line drawings by the author. The World Naturalist Series, Weidenfeld & Nicolson. 1976. £8.50.

A fascinating book written in an authoritative but easy manner, to illustrate the impact of insects on the history of man, mainly from a medical point of view: of the ten chapters, nine are devoted to the transmission of disease and the remainder to other economic aspects.

The work is well planned, but I found the accompanying line drawings disappointing: such a stimulating text could have been more ably supported by a greater variety of contemporary woodcuts (similar to that on the dust-jacket), paintings, drawings, sculptures, etc. For the most part, the figures are of a kind more usually found in standard zoological text-books (except in this case there is no indication of scale); furthermore, the delicacy of these animal drawings is not matched by eight rather crude outline maps and a difficult-to-interpret graph on page 84.

Despite these minor shortcomings, this book makes enjoyable reading and at the same time will provide a valuable source of reference since the text is complemented by a good bibliography and index.

M.R.D.S.

British Land Snails by **R. A. D. Cameron** and **Margaret Redfern.** Pp. 64. Synopsis of the British Fauna (New Series) No. 6. Academic Press for The Linnean Society of London. 1976. £1.90, soft-cover.

It is unfortunate that the publication of this number of the synopsis corresponded as it did with the publication in the Journal of Conchology of a complete revision of the nomenclature of British Land Mollusca: Walden, H. W., J. Conch. **29**: 21-25 (1976). The publication of this paper and the subsequent publication of the *Atlas of the Non-Marine Mollusca of the British Isles* by M. P. Kerney, which also uses this revised nomenclature has placed this publication in the invidious position of being out of date on its date of publication. The problems of a long delay between the writing and the publication of a volume of this type can also be seen by the fact that a further three species of land mollusc have been added to the British list since this was submitted for publication; *Lauria sempronii* (Charpentier), *Helicodiscus (Hebetodiscus) singleyanus* Pilsbry and *Cochlicella barbara* (L.).

The publication of a dichotomous key to the British Land Snails is useful but due to the variability in colour, shape and size of many of the species such a key can be beset with many difficulties and pitfalls. These difficulties can be avoided by the use of a good illustration, a description and in some cases notes on its habitats and distribution. The illustrations in the synopsis in many cases however leave a lost to be desired, and some of the habitat and distribution information is misleading and shows a lack of experience with these species on the part of the authors. *Vertigo genesii* Gredler a species now extinct in Britain is illustrated, fig. 9g, and described as a synonym and variety of *V. geyeri* Lindholm, this is no longer accepted and they are now both given specific rank. The species that lives in 'Britain' is *V. geyeri* a thin shelled toothless species which lives in very wet calcareous bogs in central Ireland.

However, with the above reservations, I feel that this could be a most useful addition to any naturalist's library and will I am certain fill a gap in the book shelves of many schools and colleges throughout the British Isles.

A.N.

Living Marine Molluscs by **C. M. Yonge** and **T. E. Thompson.** Pp. 288. Collins, London. 1976. £6.00.

"It is a general account of living molluscs, of their extraordinary diversity of form and habit, which is lacking and which this book attempts to supply." A valuable book on living molluscs, well illustrated with colour and black-and-white photographs, and clear line-drawings. The text is clear, covering anatomy, physiology and ecology, and setting all in an evolutionary context. Strongly recommended for zoology students who wish to make sense of a puzzling phylum, but also a book which any naturalist might be glad to have on his shelves.

B.S.

British Opisthobranch Molluscs by **T. E. Thompson** and **Gregory H. Brown.** Pp. vi + 204. Synopses of the British Fauna (New Series) No. 8, The Linnean Society of London, 1976. Soft-cover, £3.50.

Not since the publication of Alder & Hancock's Monograph of the British Nudibranchiate Mollusca (1845-55), has an attempt been made to produce a book describing and illustrating all the Nudibranch Molluscs found in the shallow waters around the British Isles. For Thompson and Brown to expand this to cover all the Opisthobranchs is highly commendable. Their devotion to the subject can be seen by the great care taken in the production of this volume, particularly in the very high standard of the illustrations. The publication of this synopsis will ease the problems of identification of a group of animals which until recently have been badly neglected. In this respect I have no doubt that it will find its way onto the book shelves of all who are interested in marine biology, and will become a classic of its type. In general a book which I can recommend to all who have ever turned a stone over, in a rock-pool, stopping to look at the diversity of shapes and forms which can be found.

A.N.

The Observer's Book of Tropical Fishes by **Neil Wainwright.** Pp. 160 with 16 colour plates and 19 black and white drawings. Frederick Warne. 1976. 90 p.

Naturalists and yachtsmen who slip this little book into their pockets before departing for the annual holiday in the sun will be disappointed as the book deals with tropical aquarium fishes and that should have been its title. Some 90 species of fish are described of which 72 are illustrated in colour. Information on keeping and breeding each type is given and there is a useful general introduction.

D.H.S.R.

The Winter Birds by **M. A. Ogilvie.** Pp. 224, with numerous coloured and black and white illustrations and maps. Michael Joseph. 1976. £5.75.

This is a beautifully illustrated book which on superficial examination looks like a glossy coffee table production. However it is a most interesting and full account of those birds which breed north of the Arctic Circle. The introductory chapters discuss the climate and vegetation of the area and the adaptation of the birds to the arctic environment. The breeding cycles of 130 species of birds are described and related to the ecological niche in which each species lives. The book concludes with an interesting discussion of the conservation of arctic birds. The impact of the native Eskimo was minimal until the advent of the shotgun. Far more serious has been oil development. The danger of massive pollution is ever present, but equally important is the damage to lichen and moss layer over the permafrost. The arctic circumpolar zone is the largest wilderness and wildlife habitat in the northern hemisphere. There is an urgent need for reserves and national parks. The author concludes — "It is an unbearable thought that civilisation should spoil this land, even though it is impossible to keep it away altogether. But at least let it come gently and let it be controlled".

All naturalists who enjoy these lovely birds when on migration through this country will agree with those sentiments.

The illustrations are of superb quality and enhance a most interesting and important book.

J.D.P.

Living with Deer by **R. Prior.** Pp. 150. White Lion Publishers Ltd. 1976. £3.95.

Described as a "Survival" book and "published in close association with Anglia Television's Natural History Unit", this book was published originally in 1965. The author was employed by the Forestry Commission on control work in Dorset. He shares his experiences of observing and culling deer, and outlines deer management problems during the period immediately following the Deer Acts of 1959 and 1963. This is an acceptable re-issue, but a new and up-to-date book by the same author might have been even more welcome.

B.S.

Town Fox, Country Fox by **Brian Vesey-Fitzgerald.** Pp. 160, with 9 black and white and 3 colour plates. (A 'Survival' Book), White Lion Publishers Ltd., London. 1976. £3.95.

The author has considerable personal knowledge and experience of the biology of the fox. In this account he considers various aspects of the senses, behaviour, home range, food and population dynamics of this interesting British mammal. The author writes with a fluent, engaging style. The book first appeared in 1965; this 1976 edition is a reprint of the original work. Inevitably, a great deal of interesting and relevant material on the fox which has appeared since 1965 is omitted. This is a pity as it makes the account rather antiquated. In no way can it be considered the up-to-date account claimed by the editor.

M.J.D.

The Zoological Society of London 1826-1976 and Beyond edited by **Lord S. Zuckerman** and Staff of the Society. Pp. xviii + 353, with numerous plates (7 in colour) and line drawings. Academic Press, London. 1976. £9.80.

This book commemorates the 150th anniversary of the Zoological Society of London. The twenty chapters contributed by twenty-two specialists and a foreword by Prince Philip provide a fascinating insight into the growth and role of the Society and its collections. Contributions on such topics as the management and care of animals at Regent's Park and Whipsnade, the history and development of building at London Zoo, the provision of library facilities, scientific publications, and research, educational and field study programmes are included in a symposial volume which is both readable and informative.

Squire Waterton by **Gilbert Phelps.** Pp. viii + 167. EP Publishing, Wakefield. 1976. £4.25.

This is an entertaining, but rather light-weight, treatment of the renowned Yorkshire naturalist, traveller and philanthropist, Charles Waterton (1782-1865). When not on his travels, which took him mainly to South America, he was on his estate at Walton Hall, near Wakefield, the house and gardens of which he converted into a natural history museum and nature reserve (mainly as a bird sanctuary).

To some, Waterton is an "eccentric", and to others, including the author, he is a "character"; to dissect a gorilla in the dining room at the age of 83 is, to say the least, an unusual pursuit at any age. Equally bizarre incidents occurred throughout a long life dogged by accident-proneness and illnesses cured or exacerbated by the taking of heavy doses of calomel and jalap, and by frequent blood-letting performed by himself which he referred to as "tapping the claret".

It is difficult to unravel fact from fiction in his extraordinary life, and to determine the quality of his natural history observation and interpretation which has been overrated by some and labelled poetic rather than scientific by others. One contemporary naturalist, commenting on an episode in his major publication, remarks on his "constant propensity to dress up truth in the garb of fiction'. Views on his writing ability have been equally conflicting; Edith Sitwell, for example, commented that he "was, at his best, a great writer". This new biography does not resolve these divergent opinions; it does, however, provide a fascinating *glimpse* into Waterton's life, but the account is sketchy and gives little factual information which cannot be found elsewhere in published form. Similarly, the bibliographical section is scantily treated. The text is amply interspersed with poorly-labelled plates, that rarely cross-reference to the text, and for which no sources are quoted.

Despite these misgivings, the book provides a good, *albeit short*, read, and it is particularly recommended to those interested in topographical works and the history of natural history.

M.R.D.S.

Light and Shade by **J. H. B. Peel.** Pp. 80. Robert Hale, London. 1976. £3.50.

The craft of verse is manifestly one of Mr. Peel's first loves. Using a prosody which merits the best "Poetry Society" credentials, he has striven hard for fidelity of form and expression and a voice of individual timbre. (Certain well-won "trouvailles" of his labour will charm any fellow-practitioner). If at times he sidles along the poetaster's hedges, he has his moments of genuine poetic frisson and wins our liking and respect for one who, as he says of his own Master Mason,

"did not yield
Until the stooks bestrode the field."

A.H.

ALSO RECEIVED

Trees in Britain: Bushes and Shrubs by **Roland E. Randall.** Pp. 32. Jarrold Colour Publications, Norwich. 1976. 40p.

A colourfully illustrated guide to 48 of the native and introduced smaller shrubs found growing wild in Britain.

The Outdoor Handyman by **Adrienne** and **Peter Oldale.** Pp. 288. Collins. 1976. £3.50.

Clear instructions, profusely illustrated with photographs and line drawings, for do-it-yourself jobs on lawns, hedges, garden woodwork, paths and walls which require only a few basic tools.

Country Season by **Phil Drabble**, with photographs by **Stanley Porter** and a foreword by **Johnny Morris.** Pp. 213. Michael Joseph. 1976. £4.25.

A season by season account of a well-known naturalist's encounters with birds and mammals. The work is most enjoyable, if at times a little repetitive.

The Sunday Express Weekend Gardening Book by **Maxwell Davidson**, with cartoons by **Bill Martin.** Pp. vi + 196. White Lion Publishers, London. 1976. £4.25.

A superficial and expensive book; the cartoons are entertaining, but the "technical" illustrations are abysmal.

Wild Animals in the Garden by **Heather Angel.** Pp. 32. Jarrold Colour Publications, Norwich. 1976. 40p.

Life of our Seas by **Martin Angel**, with photographs by **Heather Angel.** Pp. 32. Jarrold Colour Publications, Norwich. 1976. 40p.

Climate of Sheffield by **Derek Whiteley** and **Jeremy Lee.** Pp. 4. Sheffield City Museums Information Sheet. no. 15. 1976. 5p. (Obtainable from: City Museum, Weston Park, Sheffield S10 2TP; 13p incl. postage, payable in advance.)

From Single Cells to Plants by **E. Thomas** and **M. R. Davey.** Pp. xvi + 172. Wykeham Publications, London. 1975. Hard-cover £3.25, soft-cover £2.50.

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FAIRBURN INGS — AN EXERCISE IN CONSERVATION

J. D. PICKUP

Presidential Address to the Yorkshire Naturalists' Union, Beverley, 4th December 1976

The study of any place which is considered worthy of preservation for whatever reason must be based on a foundation of knowledge of the past history and present status of the area.

Fairburn Ings has a recorded history going back to Saxon times, and we can safely assume that it was a wetland area long before. The land adjacent to the River Aire between Ferrybridge and Castleford was and is subject to flooding. Saxon, Dane and Norman were held up as they attempted to cross the river and in 1069 William the Conqueror was delayed three weeks because Brotherton Marsh was under water. We know that there was a Saxon village Farenburne (the stream amongst the ferns) on the site of Fairburn which was recorded in the Domesday Book (1084-6) as Fareburn, held by the Saxon chief Ligulf under a Norman, Ilbert de Lacy of Pontefract Castle. Haelward had a manor at Newton, the ruins of which can be seen today with the remnants of the moat much extended by recent subsidence. By 1159 the manor of Newton belonged to the Walleys family and the moated manor house was known as Newton Abbey (ab-bé a house surrounded by water).

By 1300 Newton Manor had 84 acres of arable land, the outlines delineated in the Chartulary of St John's Priory at Pontefract can still be traced on site. The ferry over the Aire was worth two shillings a year, and fishing rights sixpence. The dovecot yielded two shillings yearly from the sale of doves' dung. The Lord of the Manor paid Sir William Clarel two shillings or one Sparrow Hawk each year on St Oswalds Day. In the summer of 1976, a Sparrow Hawk was seen frequently in this precise area, although it is a far from frequent visitor to the district.

In the 14th century, a bridge was built alongside the ferry — hence Ferrybridge. Travellers had still to proceed north through Brotherton Ings. The Bishop of Durham granted Indulgences to those who gave money or labour towards building a causeway between Brotherton and Ferrybridge. This area was rich in bird life until modern times, and should have been a breeding site of the Black Necked Grebe, had the marsh not been drained in the middle of the breeding season to provide an area for the deposition of fly ash from the nearby power stations. However, after an initial bad start, the CEGB have proved good and considerate neighbours.

Coal-mining has played a major part in shaping the area of the reserve. Drift mining was first recorded at Glasshoughton in 1535 and there is a record in the Fairburn parish registers (amongst the oldest in existence) of Churchwarden James Hewit being killed at the bottom of a pit in 1613. Whether this was a coal-pit is not clear. Coal-miners are not named in the registers until 1838. Subsidence was not a problem until about seventy years ago and in fact the land was drained between the 17th and 19th centuries and became farmland which was only under water when the river was in flood, hence the name Ing or water meadow.

On the eastern boundary of the reserve lies the magnesian limestone ridge on which runs the Great North Road from Nottingham to Durham. This has a profound influence on the flora of this area, producing many delightful and some rare plants. Although the limestone does not reach the actual reserve boundary, its use had the effect that a tunnel 300 yards long was driven under the village to communicate with a canal "to facilitate the lime works of Lord Palmerston". This tunnel still exists and the railway lines are much cherished by the industrial archaeologists as being amongst the earliest metal lines still in existence. It is probable that some of the stone quarried was used in the rebuilding of the Houses of Parliament during Lord Palmerston's lifetime. Thus the quarries produced two of the features of the reserve, the tunnel and the Fairburn "cut" or canal, from the quarries to the river.

In 1840 the railway which is the eastern boundary was opened, the first line to connect York with London. So another feature of the area was established — this provided a

boundary and also an all too ready means of access for children, vandals and free lance shooters from the industrial area across the river. It will be appreciated by now that each development is producing advantages and disadvantages to the present management of the reserve.

In 1892 the Wheldale Coal Company and the Calder Navigation built a water tight flood bank of colliery waste along the banks of the River Aire, between Wheldale Farm and Wheldale Basin, as subsidence was producing increased flooding. In 1889 three Wakefield brothers called Greaves rented the shooting rights on the Fairburn Estate and recorded the effects of mining subsidence at the turn of the century producing increased areas of marsh and open water between the Newton-Fairburn road and the river. Surface-feeding wildfowl and swans appeared first, but later tufted duck and pochard arrived as the water became deeper. By 1913 the maintenance of the river as a navigable canal became difficult so the present coal waste bank was built along the northern bank of the river from Wheldale to the viaduct. As the area of washland increased, its value as agricultural land diminished and the Coal Board acquired the land on which to tip pit waste.

In 1953-4 a group of schoolboys led by Brian Winn had observed a wader which was unfamiliar to them. Referring to books they identified it as the Little Ringed Plover *(Charadrius dubius)*. They wrote to "Nomad", the late Norman Ellison of the BBC Northern Children's Hour, who transmitted the information to George Ainsworth in Hull. He in turn communicated with R. F. Dickens, who had been watching the area since 1952. He met the boys and confirmed the presence of these birds. Breeding was conclusively proved at Fairburn and of course it had been proved previously in Swillington in 1947. Independently M. F. M. Meiklejohn had noted ringed plovers without white wing bars at Fairburn. Observers noted the typical call, distraction display and crouching of the young when alarmed.

The Ornithological Committee of the YNU surveyed the birds of Fairburn Ings, and Bob Dickens started his campaign to preserve Fairburn Ings in 1954, the year he was Chairman of the Vertebrate Section of the Union. After writing to the RSPB, Wildfowl Trust and Nature Conservancy, he and Ralph Chislett were able to arrange a meeting with the West Riding County Council officials in June 1954. With Nature Conservancy support the WRCC agreed in June 1955 to declare the area a local Nature Reserve under the National Parks and Access to the Countryside Act 1949. After prolonged discussions about the details of management, access, leases and wardening, the final declaration of the Fairburn Ings Nature Reserve was made on 28 May 1957. This brief summary does little justice to the patience and determination which Bob Dickens showed throughout this period and there is no doubt that but for him there would have been no reserve, and the area would have been lost as have many similar areas in the Aire Valley. In 1968 added protection was achieved by the declaration of the reserve as an official Bird Sanctuary as a result of a Parliamentary Order..

A Management Committee was appointed by the West Riding Council which represented the various interests such as the voluntary Wardens, YNU, YNT, Nature Conservancy, RSPB, the Coal Board, Yorkshire Ouse Rivers Board, Police and other bodies. Twelve wardens were appointed and their committee dealt with the day to day management of the reserve. Great help was given to the body by Mr Tony Waldron of the West Riding County Council Planning Department. Having achieved the objective of protection, the problems of management had to be faced. The initial consideration was to limit the encroachment of the tipping area on the open water. This was achieved after agreement by the planning officers and the NCB to a fixed line of tipping — a compensatory increase in the height of the tip being allowed.

The bank on the river side of the Ings was bare with a sparse growth of willow and a few birch trees. It was evident that rain erosion was washing the surface material into the water, which had the effect of reducing the depth of water. As a result, in the marginal areas, *Typha* was growing in abundance and was rapidly encroaching on the open water. The wardens decided to embark on an extensive tree planting programme with the objective of binding the surface of the bank and providing a ground humus which would encourage the growth of

plants. In 1960, 319 trees were planted, mainly birch, sycamore and willow. In 1961, 1,335 trees were planted, including 200 sycamores of the "Elite" variety from Wentworth Woodhouse registered under the British Tree Seed Association. From then onwards to 1975 at least 3,000 trees were planted each year, mostly provided by the West Riding County Council and recently by the West Yorkshire County Council. In addition many private donors gave and planted trees. Alder, Oak, Willow, Silver Birch and Sitka Spruce were the main species introduced. The change in the bank over the period from 1957 to the present day is evidence enough of the effectiveness of this work. The erosion of the bank has been halted and a thick undergrowth of vegetation established. The trees are a haunt of redpolls, linnets and warblers, providing both nesting cover and food for a large variety of birds. The programme was extended to the western end of the area as far as was compatible with tipping operations and the building of slurry ponds.

The residents of Fairburn became increasingly incensed with the appearance of the tipped area at the western end of the main bay in contrast with the tree lined eastern end. The coincidence of this and the application by the NCB for mining facilities at Selby, made that body more responsive to the environmental impact of their operations. In 1976 they have put top soil on the open surface facing the water and a grassing and tree planting programme is proposed, with the help of the North Yorkshire County Council. In the meantime this surface is showing severe erosion and runnels have developed down into the water and there is a steady loss of surface soil.

All the tree planting has been done by voluntary labour of the wardens, school children, Natural History Societies and individual friends of the reserve. This sustained voluntary effort is a reflection of the interest which many people have for the reserve and a great debt is owed to them.

In 1966 D. F. W. Pollard of the Wildfowl Trust surveyed the area. He noted the erosion of the banks, which emphasised the need to continue the tree planting. He related the vegetation to wildfowl populations in three ways:

(i) **Food production.** The seeds of plants, particularly aquatic and marsh species, form a major part of the diets of dabbling duck. He noted that *Potamogeton pectinatus*, *Glyceria maxima*, and *Hippuris vulgaris* were abundant and with *Juncus effusus* and *J. inflexus* under flood conditions were providing adequate food. *Potamogeton natans*, *Ranunculus aquatilis, Sparganium erectum* and *Alnus* spp. were present but as yet not sufficiently prolific to play a role in wildfowl maintenance. The large proportion of open water dominated by *Potamogeton pectinatus* accounts for the large winter population of Pochard and Coot. *Glyceria* and *Hippuris* are present in extensive stands and make a significant contribution to the food of dabbling ducks, particularly Teal and Shoveler. The *Juncus* species are attractive to Teal. He concluded that the Ings were exceptional in the abundance of suitable wildfowl food.

(ii) **Cover and food during the breeding season.** The island at Fairburn, with dense stands of *Glyceria* and *Typha*, provides nesting cover and a nursery for young birds, protection from predators, human interference and strong winds, and a supply of insect life. The strong breeding colony of Pochard and Tufted Duck was attributed again to this factor.

(iii) **Cover and food following the breeding season** which is essential after breeding when the birds are in "eclipse". Here again, *Potamogeton pectinatus* has its seed production well advanced in July when this takes place and is an important factor affecting the summer population of Pochard.

D. F. W. Pollard concludes ". . . Fairburn and Newton Ings are therefore of particular interest in that they form an almost ideal habitat for a number of wildfowl species during both the winter and the breeding season".

This was most encouraging, but the steady growth of *Typha* and *Glyceria* in the late 60's gave great cause for concern. The island at low water was connected to the land and predators such as foxes had ready access to the young nestlings, not that a short strip of water prevented them from swimming to the island. So serious was this problem that in the cut area, and the region of the island in the main bay, consideration was given to the excavation of much of this growth of vegetation. However, the activities of the Coal Board took a

hand and a sudden increase in subsidence drowned a great deal of the vegetation. The principal area was the eastern end of the reserve which caused loss of the Black Headed Gull colony in the cut area. The combination of tipping and subsidence sealed the fate of the attractive Water Violet *(Hottonia palustris)*.

The loss of the marginal vegetation was a serious threat to the breeding birds who were dependent upon it for shelter and food. To mitigate this, in 1969 the Wardens constructed rafts which were tethered off the island and on which were placed Dutch wicker duck baskets. They were occupied by coot almost at once, and later by duck.

The situation has been improved by the subsidence at the western Newton end of the reserve forming a pool named "New Flash". In the last year, a series of pools on the northern side of the Fairburn to Allerton Bywater road have produced further feeding, resting and it is hoped breeding sites for waders and water birds. Finally in recent months, an area of water many acres in extent in the lea of the western tip face has appeared and this is already a very good area for swans, ducks and waders, having well established marginal vegetation of *Carex* sp. and *Typha*.

The remaining effort to provide undisturbed places for resting and breeding birds was to enlist the help of the Army through their "Military Aid to Civil Authorities" programme, to construct a chain of islands in the main bay. After a hydrological survey, a line of six islands were made by the Territorial Army as a training exercise. The islands have been successful as resting places — the establishment of vegetation has not as yet been as successful.

The other threat to the birds was disturbance by egg collectors and shooters. This was controlled by the Wardens, led by the honorary chief warden Charlie Winn. His devoted work was invaluable, and, for the first time, daily records of the birds were kept with an immediate increase in the sightings of an immense variety of migrants. In all, 227 species have been recorded and 60 species breed on the reserve. The other management requirement was to make provision for visitors. In 1966 a hide was built facing the island, the money being provided by wardens and friends who contributed £2 each for a key. All the construction work was done by the wardens. After this a further hide was built on the cut area which gave good views eastwards from the cut, the money for this being provided by the WRCC. The most successful public relations effort was the construction of a parking bay on the Newton Road in 1970. This proved a "honey pot" which was at times too attractive and produced queues of cars on the road. However, the provision of a feeding peninsula which took the visitor out into the water, provided ideal viewing conditions. The credit for this inspired idea must go to the County Planning Department. An attractive identification board was painted by P. Swayne. Michael Clegg, in an article on "Time Lapse Conservation", states ". . . If I was in a position to make an award for a Nature Reserve which has really started to cope with visitors and yet keeps itself as true to the ideals as possible, my Yorkshire trophy would go to Fairburn Ings near Castleford. For bringing people and wildlife together in the nicest possible way, their car park and duck walk is a shining example in public relations".

In fact the reserve was given the Countryside Award plaque in 1970. All this effort would be of no avail if there was nothing to preserve. Surveys of the various aspects of the flora and fauna were made by many YNU members. The initial botanical survey was made by the late Rev. P. M. Garnett, Mr Robert MacKechnie and the late Miss C. M. Robb in 1966. There were previous records available. One of particular interest was the account by Dr. W. A. Sledge of the occurrence of *Juncus compressus*, previously recorded by Lees in the area, and *J. gerardi*, a plant not previously recorded in mid-west Yorkshire, being a rush of coastal salt marshes and dependent on saline conditions. E. Thompson contributed a botanical list for the area and makes the point that the greater part of the flora has arrived in recent years. In the Fairburn Cut area, Sweet Flag *(Acorus calamus)* is in the place where F. A. Lees recorded it, and in the same area is *Rumex palustris* which is not recorded elsewhere in the county, whilst Golden Dock *(Rumex maritimus)* was also found there. The latter has not been seen lately. He records the Hairy Sedge *(Carex hirta)* and False Fox Sedge *(C. otrubae)* and the local Bladder Sedge *(C. vesicaria)*. It has already been stressed that the sedge species have a valuable part to play as food for waterfowl.

The alien Buttonweed *(Cotula coronopifolia)* was first recorded in 1962; at one time this plant was only known on the Wirral. It is now plentiful although not quite on the impressive scale seen at Mickletown Flash across the river. In recent years *Archangelica archangelica* has appeared, no doubt being transported downstream by the River Aire where it is well established. Miss C. M. Robb discovered a rare hepatic *Riccia fluitans* in 1957, and Mr. G. Shaw recorded the moss *Physcomitrella patens* from Newton Moat.

The mollusca of the area were surveyed by various experts in 1949 and finally in 1960 by S. G. Appleyard. The most impressive species to the non-expert is the plentiful Swan Mussel *(Anodonta cygnata)*.

Fish are numerous and of large size. In February 1960 Mr Donald Weaver of Pontefract caught a pike weighing 19½ lbs. These large pike are a constant menace to the young water birds which they consume with avidity. In addition, roach, perch, carp, tench and bream are caught by the anglers of the Castleford and District Amalgamation Society who have limited fishing on the reserve.

The other vertebrates (excluding birds) have been insufficiently recorded, but one exciting event took place in August 1975. Mr Arthur Pearson, a perceptive and diligent amateur naturalist was searching for Harvest Mouse *(Micromys minutus)* nests, and less than 50 yards outside the reserve boundary at Ledston, found the first nests recorded in this century in Yorkshire, containing live young harvest mice. Later he found evidence that this species bred within the reserve.

The insect life of the Reserve has received less attention than the flora and birds; J. H. Flint and his family and R. Crossley visited the Reserve and their records are quoted in a review of the area. The prolific midge and mosquito population has an obvious bearing on the attractiveness of the habitat to breeding and migrant birds. One interesting find was the gall (approximately three years old) of the longhorn beetle *(Saperda populnea)* on the stems of *Salix caprea*, which had not been recorded as a live beetle for 30 years. The large black and red hopper *(Cercopsis vulnerata)* was also found, and the rarer little hopper *(Paraliburnia lugabrina)* is at the northern limit of its range.

The butterflies are unexceptional except that the nearby woods at Ledsham are probably one of the greatest strongholds of the Speckled Wood, *Parage aegaria*. In 1976 Fairburn shared in the increased sightings of Brimstone butterflies, with one seen by the warden, Steven Madge, on 26 July 1976. Moths have been surveyed by C. H. Pickup, and more recently by Steven Madge. Two interesting records were made of the Southern Wainscot *(Leucania straminea)* in 1969 and 1970, also at the northern edge of its range and uncommon in Yorkshire. On 10 and 14 August 1976 Steven Madge caught two specimens of the Dusky Sallow *(Eremobia ochroleuca)*, a species with a limited distribution in the county, and on the first date he had the local Oblique Carpet *(Ortonama lignata)*. Another delightful migrant moth seen in 1976 was the Humming-bird Hawk Moth *(Macroglossum stellatum)*.

In all the orders of invertebrates there is considerable scope for further work. As the older habitats become more established and the newer marsh areas change, it would be of interest to record the fluctuations in these orders. However, the main interest in the area has always been in its bird life. I have already indicated the attractiveness of the area to breeding waterfowl. It would seem that in relation to these species, success or failure of the reserve might be measured by their breeding success. In fact it is difficult to obtain precise figures from the printed records. W. G. Bramley's paper in 'The Naturalist' of August 1938 on "A Dismal Swamp and its Avian Problems" gives some interesting records.

The most striking example of change is shown by the information available on the Great Crested Grebe *(Podiceps cristatus)*. Ralph Chislett writes in Yorkshire Birds ". . . no water in Yorkshire can compare with Fairburn flash. As the area of this subsidence-formed water grew, hedgerows and bushes became flooded until only the tops of hedgerows stood out and it became possible to see Grebe sitting on nests in the top of dead thorns and other bushes. As the hedgerows died, extensive beds of waterside plants provided alternative nesting sites. From 1921 when 3 pairs bred, the numbers increased until in 1928, A. Whitaker found 16 nests containing eggs, in one day, without investigating the whole area, and estimated the full number of birds at not less than 20-25 pairs. On 3 August 1931, Booth

counted 15 pairs with broods on the water and another bird sitting. Latterly, birds have been rather fewer, but W. Bennett counted 10 breeding pairs in 1949". In 1951, 12 pairs were seen; in 1953, 16 pairs. 5 nests were counted and by 1955, 23 nests with 21 broods were recorded. However, this high count probably included the Brotherton Ings nests, prior to the destruction of that area by the tipping of fly-ash. The gradual disappearance of the old hedgerow tops and the marginal vegetation is reflected by the fact that by 1968-69, 9 or 10 pairs were present, falling to 1 brood with 3 young in 1975, and 3 pairs with only 2 young reared in 1976. Thus, the environmental changes have worked adversely against this attractive species.

The Little Grebe *(Podiceps ruficollis)* is less well recorded. We know that there were 11 broods with 57 young in 1957, with a probable fall in numbers until the advent of the new flash, where 5 of a total of 6 pairs on the reserve reared 16 young.

The story of the breeding ducks is more variable. It is a strange fact that there are no records of successful breeding of Mallard *(Anas platyrhinchos)* or Teal *(A. crecca)* prior to 1968, and the first definite record of a successful brood is 9 broods of Mallard and I brood of Teal in 1974. The new flood areas in 1976 have produced a spectacular rise in breeding success, with 32 broods (12 on the new flash area) of Mallard which produced 197 young. Teal produced 4 broods with 28 young. Gargany *(A. querquedula)* are seen annually in small numbers and two family parties were seen in 1957, but I can find no evidence of breeding since that date. The story of the Gadwall *(A. strepera)* population is one of rapid change, being unknown up to 1953. By 1961 a maximum of 8 was recorded rising to 17 in 1958 and 67 in September 1974. Breeding probably occurred in 1962 and single broods were recorded in the last three years; in 1976 there were 9 young, of which 8 were reared.

Wigeon *(A. penelope)* may have bred in 1949 and 1953 but this species is more noticeable in the winter with maxima of over 58 in 1974. Shoveler *(Spatula dypeata)* have followed a different pattern from the other dabbling ducks. In 1928, 12 pairs were seen but evidence of breeding was first mentioned in 1922; since then, 1 or 2 broods were seen from 1953 until last year when the largest number was recorded with 3 broods (2 on the "New Flash" area) producing 21 young.

The most important breeding wildfowl of Fairburn are the two species of diving ducks, Tufted Duck and Pochard. Breeding of Tufted Duck *(Aythya fuligula)* was first recorded in 1922 and in 1925, 15 to 20 pairs were seen by W. G. Bramley but no mention is made of breeding success. From 1953 to 1967, 1 to 4 broods were seen, but in 1974 there was an increase to 7 broods. In 1975, 15 broods and in 1976, 26 broods produced 135 young (3 broods being on the New Flash area).

Pochard *(Aythya ferina)* have been equally successful with the earliest recorded breeding by A. Whitaker in 1928. Between 1953 and 1956 nests or broods were recorded as 4 in 1953, 9 in 1954, 12 in 1955 and 16 in 1956. By 1959 this had fallen to 6 broods and 4 in 1960, probably reflecting the loss of protective vegetation due to subsidence. Then in 1974, 7 broods were seen, 8 in 1975 and to end on a triumphant note, a record 24 broods in 1976, 5 of these being on the New Flash area and 2 on the adjacent Ledston Flash. From this, 91 young were seen. Thus it is clear that in the early years, the danger to breeding wild fowl came from shooting and disturbance. This virtually ceased with the creation of the Reserve. Then subsidence destroyed some of the breeding areas, but eventually created new areas of water with marginal vegetation which proved attractive to breeding birds.

The winter flocks of duck and coot are a conspicuous feature, with average figures of *c.* 1,000 Mallard, 600-1,000 Teal, over 100 Shoveler, 200 Tufted Duck, 300-500 Pochard and 1,000 Coot. Added to this are the attractive flocks of Goldeneye, Wigeon, the occasional Sawbills and Whooper Swans, with a few Bewick Swans. It is obvious from such a quantity of feeding birds that the food supply is still satisfactory. However, increased subsidence could reduce this state by putting the potential food out of reach of dabbling and diving ducks.

Marginal areas and mud created by the wardens in front of the hides prove attractive to migrant and breeding waders. Lapwing *(Vanellus vanellus)*, Snipe *(Cepella gallinago)*, Redshank *(Tringa totanus)* and Little Ringed Plover *(Charadrius dubius)* breed on the reserve. The association of the reserve with the river places it in line with the trans-Pennine

flyway which migrating birds follow in and out of the east. This accounts for the constantly changing picture of bird life in spring and autumn. Amongst the other breeding species of birds two warblers should receive special mention: they are the Sedge Warbler *(Acrocephalus schoenobaenus)* and Reed Warbler *(A. scirpaleus)*. Fairburn is an ideal habitat for these birds and one of the Yorkshire strongholds. The Sedge Warbler produced between 20 and 25 breeding pairs in 1955 and in 1969 it was estimated there were probably in excess of 50 pairs. The Reed Warbler is a southern species and is at the northern limit of its breeding range in Yorkshire. In 1963, 37 pairs were recorded, this probably represents the maximum figure for the reserve. These species are dependent on marginal vegetation and their continued existence is obviously related to the persistence of *Typha* and *Phragmites* on the reserve. The reed and typha beds of Fairburn provide one other feature, the large late summer roost of hirundines, particularly Swallows *(Hirunda rustica)* and Sandmartins *(Riparia riparia)*. The largest roosts occurred between 1959 and 1965 when over a million birds were estimated not infrequently. Mist netting and ringing produced many interesting results. Many birds come from Scotland, in this period 15 birds were recovered of Scottish origin. Others come from Durham, Northumberland, Cumberland and Westmorland. At the other end of the migration, Swallows were recovered in Natal, Orange Free State, Transvaal, Cape Province, Congo and Nigeria. Sandmartins were recovered in Spain and Southern France. Obviously the loss of reed beds has reduced the size of this roost and numbers of hirundines in the autumn are not as great in recent years.

The birdlife of the Aire Valley is dependent on the existing chain of marsh, mere and water meadow. Fairburn, without Swillington, Methley and Mickletown Ings and other wetland areas in the lower Aire Valley at Birkin and elsewhere to the east would be devoid of escape areas for wildfowl when disturbance occurs and it likewise acts as a refuge for these areas. One cannot consider the subject of protection in one area without looking at the totality of the washlands of the district. Every piece of flooded land lost by opencast mining or drainage will have an enormous impact on the wildlife of the County and could diminish the important part played by the Aire Valley complex, as a wildfowl refuge.

Having established the relative success of conservation, what was to be the next phase? For many years the wardens felt certain that for an area so large and so vulnerable as Fairburn Ings, there was need for a full time professional warden to maintain a twenty four hour surveillance of the reserve. This would reduce vandalism, shooting and egg collecting and also provide a more comprehensive survey of the natural history potential. In addition visitors could be helped and controlled more effectively. With these principles in mind the RSPB was approached and themselves expressed keen interest in becoming involved in Fairburn Ings reserve. After prolonged negotiations they acquired the lease in 1976 from the NCB with the help of the West Yorkshire Authority. A full time warden, Stephen Madge, was appointed and is now actively assessing the reserve and its problems. The voluntary wardens were considered by the RSPB to have a unique involvement in the management of the reserve and a special Warden's Advisory Committee was appointed. This is a tribute to the devoted work by all the wardens through the years. Management is by a Management Committee of the North and West Yorkshire County Councils.

So the first phase in this conservation exercise is completed and a new professional, assisted by amateur, phase starts. The acquisition of the skills and experience of a national organisation can only be to the benefit of the flora and fauna of the district.

Conservation has become one of the "in" words in modern society. We pay lip service to it in many fields but always with the proviso that whatever we seek to preserve, must be for the benefit or enlightenment of human beings. The thought that our plants and fauna have an inherent right to exist does not as yet enter into the philosophy of modern man. A well known conservationist in this County recently stated that there was no hope of impressing on planning authorities the need to stop a development unless by so doing, an educational or some other human benefit was seen to be possible. The loss of a breeding animal or insect, or of a rare plant may be permanent and we must educate the bureaucrats to appreciate that they have as great a value as fine buildings or works of art.

The other threat is that our own propaganda produces interest which can destroy delicate

habitats for ever by the sheer volume of public pressure on them. We must grade our reserves into those where visiting is possible, those where restriction is needed and those where total exclusion of the public is required. Reserves which become a network of tarmacadam paths and public lavatories lose their souls and become sophisticated but irrelevant wildlife parks. These facilities should be kept unobtrusive and to a minimum.

Schweitzer expounded a philosophy of "reverence for life" and I believe this has always been the approach of generations of the dedicated naturalists who have worked within the Yorkshire Naturalists' Union. It is that motivation which has made Fairburn Ings Nature Reserve possible and to which I have tried to pay tribute. This has only been possible by the liberal use of the work of many people, including Bertha Lonsdale and her historical review of the area, R. F. Dickens, Charlie Winn, Stephen Madge and a host of other ornithologists, the botanists to whom I have already referred, especially Eric Thompson, and the entomologists, J. H. Flint, Roy Crossley and others.

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RUTH KILBY, 1901 — 1976

Miss Ruth Kilby of Boston Spa died suddenly on 18th September 1976. She was in her 76th year and had been interested in Botany since childhood. Her professional life was spent as a teacher and headmistress at a school near Castleford; but her love of wild flowers grew even stronger with the passage of time and became the chief interest of her life. She was a member of the Y.N.U. for more than 30 years and from time to time attended field meetings, but her journeys in search of flowers took her to distant parts of England and Scotland. These journeys were often made with her friend Miss E. J. Harling — for many years another Y.N.U. member — or with the Wild Flower Society. Her keen eye missed nothing when out on a botanical excursion and perhaps her best find was made on the Y.N.U. meeting at Litton in 1952 when she discovered *Arenaria gothica* above Heseltine Gill, new to the Wharfe drainage area.

Ruth Kilby was a quiet and retiring person, drawn towards others with kindred natural history interests and she had a remarkably retentive memory for botanical matters. She will be missed by her friends both for her personal qualities and for the enthusiasm and knowledge which she brought to field excursions.

BIRD PELLETS FROM A SOMERSET LEVELS NEOLITHIC TRACKWAY

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SUMMARY
Four dense accumulations of insect remains associated with the timbers of Abbot's Way, a Neolithic trackway, are identified as bird pellets, possibly formed by a member of the crow family. Examination of the beetle content shows that although dominantly composed of peat bog species, the pellets do contain other species which require different habitats. The importance of this form of insect transport and its possible significance in archaeological deposits is discussed.

INTRODUCTION

The prehistoric trackways embedded in the peat of the Somerset Levels have been investigated by archaeologists for many years and current excavations are carried out by the Somerset Levels Project. The best known of these trackways, Abbot's Way, is a Neolithic structure which connects the 'islands' of Westhay and Burtle, dated by radiocarbon measurements of 5 samples to about 2,000 B.C. (Coles, 1975). In July, 1974 a 33 m stretch of the trackway was excavated by the Somerset Levels Project. In addition to the careful archaeological techniques employed in recording and lifting the track (Coles and Orme, 1976), the timbers were subjected to dendrochronological analysis (Morgan, 1976) and associated peat was investigated for botanical (Beckett and Hibbert, 1976) and insect remains (Girling, 1976). These latter studies were carried out on a peat monolith, which included the raised bog deposit containing the trackway, and successively earlier layers to the underlying clay horizon 2.5 m below the surface.

During the excavation, archaeologists noticed occasional insect remains embedded in the peat. Common amongst these finds were the metallic legs and undersides of *Geotrupes* spp., *Plateumaris* elytra and large dipterous puparia. These constitute only the conspicuously visible element, and a much more extensive fauna was washed out of samples collected at the trackway level. Inferences about the depositional environment are generally based upon the total fauna from a standard sampling unit and not upon these highly attractive but probably not representative species. An exception was made, however, with the discovery of four small insect clusters found on the trackway by the excavators. The density of insect remains, vastly exceeding numbers usually found in peat merited further investigation. The first and largest was found as the mat of *Eriophorum* peat overlying the track was peeled away from the timbers. The black, roughly circular accumulation, measuring about 5 cms in diameter and partly draped across one of the timbers, consisted of large numbers of insect remains. Three similar clusters were subsequently uncovered at trackway level.

The clusters were found to be composed of closely packed insect exoskeletons, dominantly of carabid beetles. In many of the beetles, the entire exoskeleton was present, the heads, pronota and elytra generally in their relative positions, but with the legs and smaller sclerites frequently packed into the thoracic cavity. The suggestion that these compact masses of insects originated as bird pellets was made by Dr. G. R. Coope of Birmingham University, on the basis of their content and, in particular, the close packing of the exoskeletons which is very characteristic in pellet material. Bird pellets are agglomerations of the undigested

remains of food, which are regurgitated or 'cast' usually during the early morning prior to leaving the night's roost, and also during periods of intense feeding activity during the day.

The pellet mechanism explains both the high density of insect remains and the introduction into the raised bog deposit of beetles which do not live in such habitats.

Species List (see opposite page)

Insect remains were extracted from the pellets first by hand sorting then by disaggregating the remaining peat in warm water, washing this on to a 300 micron sieve and sorting small amounts in alcohol under a binocular microscope. Most of the smaller beetles and ants were recovered this way. The nomenclature of the species list follows Lindroth (1974) for Carabidae and Kloet and Hincks (1945) for other Coleoptera. The numbers given represent the minimum numbers of individuals present based upon the highest number of any particular skeletal element.

Species of Particular Interest

A notable occurrence in three of the pellets is *Cymindis vaporariorum*, represented by at least 34 individuals. Today this species is found only in Scotland, Wales and on high ground in northern England. It appears unlikely however than any climatic significance can be attached to its presence in Somerset in the Neolithic. It is the only beetle in the pellets which is no longer found in southern England and furthermore, there are records from the Abbot's Way monolith of two central and southern European species which are now extinct in Britain. *Oodes gracilis* Villa and *Anthicus gracilis* Panz. are confined to the monolith base but their disappearance higher up is attributed to ecological changes and there is no evidence of cooling at trackway level.

If the whole European range of *Cymindis vaporariorum* is examined, its northernness in Britain appears anomalous. On the continent it is far more widespread, occurring over most of Scandinavia (Lindroth, 1960), north, central and east Germany (Reitter, 1908) and northern France (Jeannel, 1942). The species is a pronounced xerophile (Lindroth, 1949). preferring sand and gravel substrates and within its geographical range it is restricted to dry, acid biotopes such as the glacial end moraines of the north German plain. In the Somerset Levels, the sand islands of the Burtle Beds would have provided one of the rare habitats available to the species. The scarcity of such habitats in the south is probably the major feature determining the beetle's disappearance from this part of the country.

Another comparatively rare species present in the pellets is *Agonum ericeti*. This acid heath species has a disjunct distribution in Britain, again a reflection of the present deficiency of suitable habitats.

The Bird, its Diet and Feeding Range

The diet indicated by the Abbot's Way pellets would suit many birds, particularly those of the crow family. Newstead's (1908) records for corvids show that insects were important in several species, for instance, 127 individuals of the click-beetle *Agriotes obscurus* were found in the crop of a jay. Other species eaten by jays included ground-beetles and chafers, and beetles were also found in the crops of jackdaws, rooks and carrion crows. The general preservation of the beetles, i.e. very little fragmentation of the exoskeleton, is similar to that observed in modern crow pellets, whereas owls and birds of prey tear insects to pieces when feeding. The numbers of beetles varies in the pellets from 20 to over 250, and the higher total would not be unexpected for a corvid. The selection of medium to large species suggests birds of crow size. The presence of nearly 200 ants in the largest pellet may indicate anting. Goodwin (1976) in discussing the habit, which is widespread amongst passerines and possibly common to all crows, states that once the defensive fluid has been applied to the plumage, the ant is usually discarded. This is always the case with jays and certain magpies. Other corvids, however, are known to eat the ants.

Name	*Pellet Number*			
	1	*2*	*3*	*4*
HEMIPTERA				
Homoptera *indet.*	1	—	—	—
Hemiptera *indet.*	1	—	—	—
COLEOPTERA				
Carabidae				
Cychrus rostratus (L.)	—	—	1	—
Pterostichus diligens (Sturm)	103	48	21	5
P. minor (Gyll.)	10	—	—	—
P. nigrita (Payk.)	58	6	14	8
Agonum ericeti (Panz.)	38	29	7	5
Agonum viduum (Panz.)	1	—	—	—
Bradycellus ruficollis (Steph.)	1	—	—	—
Amara aenea (Deg.)	1	—	—	—
Cymindis vaporariorum (L.)	10	8	16	—
Hydrophilidae				
Helochares sp.	1	—	—	—
Enochrus sp.	1	—	—	—
Silphidae				
Silpha tristis Ill.	1	—	—	—
Phosphuga atrata (L.)	1	—	—	—
Staphylinidae				
Stenus sp.	1	—	—	—
Lathrobium terminatum (Grav.)	3	—	—	—
Ochthephilum fracticorne (Payk.)	1	—	—	1
Xantholinus linearis (Ol.) or *longiventris* Heer	2	—	—	—
Staphylinus stecorarius (Ol.)	—	5	—	—
Philonthus sp.	3	—	—	—
Tachyporus sp.	3	—	—	—
Gymnusa brevicollis (Payk.)	11	—	—	—
Drusilla canaliculata (F.)	1	—	—	—
Aleocharinae *indet.*	12	—	2	—
Elateridae				
Corymbites sjaelandicus (Mull.)	2	—	—	—
Sericus brunneus (L.)	2	—	—	—
Helodidae				
Gen. et spp. indet	4	—	2	—
Chrysomelidae				
Plateumaris discolor (Panz.)	1	—	—	—
Haltica sp.	—	—	—	1
DIPTERA				
Gen. et sp. indet.	1	—	—	—
HYMENOPTERA				
Parasitica	4	—	10	1
Formicidae	198	—	26	2
ARANEAE	10	—	1	—

Pellets in Archaeological Deposits

Significant in the Abbot's Way pellets is the introduction into a peat bog area of beetles requiring different habitats from those available in the immediate area. The study supports the conclusions of Kenward (1975, 1976), that one of the mechanisms for the introduction of insects into a sterile urban environment is passive transport by birds. It is, however, considered unlikely that the occurrence of pellets in a samples series would escape notice or lead to significantly different environmental inferences. The characteristic packing of sclerites into the thoracic cavity does survive sample pretreatment and this, possibly accompanied by an increase in numbers of selected insects, would indicate the presence in the sample of pellet material. Furthermore, no great distances are involved in this form of transport as birds are reluctant to undertake long journeys whilst carrying pellets. The presence of pellets may be advantageous, as in the case of Abbot's Way, where evidence is provided of neighbouring habitats different from those at the site.

The occurrence of the four pellets from the Abbot's Way suggests that the trackway provided a roosting site in the low-lying terrain. As available evidence indicates a general absence of trees in the raised bog, the trackway itself may have provided perches in the form of planking or the pegs which projected 20–30 cms above the timbers.

Acknowledgements

I thank members of the Somerset Levels Project for drawing my attention to the pellets, Dr. J. M. Coles for comments on the archaeology and Dr. G. R. Coope for help with this project and criticisms of the manuscript.

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MACROPHYTES OF THE RIVER WEAR: 1966 — 1976

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SUMMARY

An account is given of a partial re-survey of the macrophytes of the River Wear carried out in 1976, ten years after a previous survey. Among the obvious differences between the two surveys, the following seem likely to represent long-term trends. There were apparent invasions into the main river, and certainly rapid spreads, of *Ranunculus penicillatus* var. *calcareus* and *Callitriche* spp. The spread of *Ranunculus penicillatus* var. *calcareus* was so rapid that, although it was first noted only in 1970, it was perhaps the most abundant submerged angiosperm in 1976. *R. fluitans* showed a moderate increase both in its range and abundance since 1966. Other species which had increased in range or abundance were *Hildenbrandia rivularis, Eleocharis palustris, Elodea canadensis, Potamogeton natans, P. perfoliatus* and *Myriophyllum spicatum*. In contrast there was a decrease of *Cladophora glomerata* at sites above Brotherlee, and a general decrease in *Zannichellia palustris*.

In order to assess the possible reasons for changes in the macrophyte flora, a summary is included of environmental observations made by the Northumbrian Water Authority and by us. The following differences are apparent between the decade under study, and the years immediately before 1966: more major floods, increased suspended matter from open-cast coal mining, slight increase in heavy metal contamination at several sites, decrease in pumped mine water, improved quality of some sewage effluents. While the last two of these have probably been responsible for the increases observed in amounts of submerged angiosperms in the R. Gaunless and R. Browney, respectively, it is uncertain to what extent they have been important factors leading to the increased growths in the middle and lower stretches of the main river. It seems likely that these can be for the most part interpreted as part of the long-term changes taking place since the period of greatest pollution by the mid-Durham coal industry. The increased growths in the tributaries may however have aided the spread of certain species by providing more inocula to the main river. The decrease in *Zannichellia palustris* is due probably to increased competition from *Potamogeton* species. It is uncertain whether a period of relative stability has yet been reached, but further slight changes may be expected when planned changes in river management are completed.

INTRODUCTION

In 1966 a survey was made of the distribution down the River Wear (excluding the estuary) of all plant species that could be recognized easily with the naked eye (Whitton & Buckmaster, 1970). This survey was made at a time when there had been marked changes in the condition of the river during the previous decade. It seemed probable that there had also been marked changes in the vegetation, as local evidence indicated that there had been a great increase in the amount of 'weed' in some of the middle and lower reaches during 1958–1965. Since it was unclear in 1966 whether or not the vegetation in the river had reached relative stability, a new survey in 1976 was planned. Such a survey would serve as a baseline to monitor any further changes in the vegetation. These changes may result from future changes in river management such as the transfer of water from the Tyne to the Wear (see below).

FLORISTIC LITERATURE

Since the account of Whitton and Buckmaster (1970) some additional reports on the Wear have been published. A check-list of the vascular plants of County Durham (Graham, Sayers & Gaman, 1972) shows that there are a number of aquatic species present in ponds in the



Figure 1. Map of River Wear. Unshaded parts represent stretches of river surveyed in 1976.

Wear catchment which have not so far been found in the river. In addition, a few species are reported from the Wear which were not found by Whitton and Buckmaster in 1966. The records for the main river concern *Sagittaria sagittifolia* L. (in 1927), *Potamogeton praelongus* Wulf. (in 1943: see Heslop-Harrison, 1943) and *P.* x *cooperi* Fryer (in 1944: see Heslop-Harrison, 1944). Graham *et al.* suggest that the first may now be extinct in the county and state that neither of the *Potamogeton* records made by J. W. Heslop-Harrison were confirmed by J. E. Dandy. *Callitriche hermaphroditica* L. was reported from the Upper Waskerley Reservoir and its catchment area in 1942.

Holmes, Lloyd, Potts and Whitton (1972) reported that there had been an apparent invasion, and certainly a very marked spread, of *Ranunculus penicillatus* (Dumont) Bab. var. *calcareus* (Butcher) C. D. K. Cook in some of the lower non-tidal reaches of the Wear. They also reported that while the following species were present in the Tyne above the projected site for water abstraction, they were not recorded from the Wear: *Nostoc? verrucosum* Vauch., *Hildenbrandia rivularis* (Liebm.) J. Ag., *Collema* sp., *Myriophyllum alterniflorum* L., *Potamogeton* x *nitens* Weber, *P. pusillus* L., *Tetraspora lubrica* (Roth.) C. Ag. *Hildenbrandia rivularis* had however colonized stretches of the Wear by 1975 (Holmes & Whitton, 1975b). The following macroscopic algae had not been found in the Wear by 1975, although present in other main rivers in N-E. England or S.E. Scotland: *Nostoc parmelioides* Kütz., *Heribaudiella fluviatilis* (Aresch.) Sved., *Cladophora aegagropila* (L.) Rabenh., *Monostroma bullosum* (Roth.) Wittrock, *Rhodoplax schinzii* Schmidle & Wellheim. The benthic algae of the Wear estuary were surveyed by Edwards (1972, 1975) in September-October 1970. 43 species were listed, many of which may be regarded as macrophytes. The largest number of species occurred at the estuary mouth, and in general the further upstream, the fewer the species. It seems probable that sites 13-16 of Edward's survey lie upstream of the most downstream point included in the survey of Whitton and Buckmaster.

The following species were listed from within that reach of river: *Prasiola stipitata* Suhr, *Rosenvingiella polyrhiza* (Rosenv.) Silva, *Ulothrix flacca* (Dillwyn) Thuret, *Blidingia minima* (Kütz.) Kylin, *Enteromorpha intestinalis* (L.) Link, *E. prolifera* J. Ag., *Rhizoclonium riparium* (Roth.) Harvey, *Vaucheria pilobiloides* Thuret. Another account of the benthic algae of the Wear estuary was given by Wilkinson (1973) based on a survey made on 7 July 1973. The following algae formed macroscopically obvious growths at Fatfield (km 94.9): *Rosenvingiella polyrhiza*, *Enteromorpha intestinalis*, *E. flexuosa* (Wulf. ex Roth.) J. Ag., *Rhizoclonium riparium*, *Oedogonium*, *Vaucheria simplex* Crouan (id. J. L. Blum), *Euglena*, *Phormidium*.

Environmental Background

The River Wear runs 106.9 km from Wearhead to Wearmouth Bridge, Sunderland (Fig. 1). The present paper deals with the river only as far downstream as km 96.0. A general introduction to the river has been given in the previous account (Whitton & Buckmaster, 1970), while the climate of the region has been reviewed by Smith (1970) and the hydrology by Cairney and Storey (1970). Much more detailed information is given in the *Report on Survey of Water Resources* published by the Northumbrian River Authority (1973). The fall in height of the river, and hence typical current speed, is greatest in the upper half of the river (Fig. 2).

There were more major floods during the decade under consideration than there were in the preceding period. Data from the Northumbrian Water Authority show that there were five floods in the period from September 1966 to August 1976 which were large ($> 270\,m^3\,s^{-1}$) at peak discharge at Sunderland Bridge gauging station, than any which occurred in the period 1957 — August 1966. These were: 1 Nov. 67 ($577\,m^3\,s^{-1}$), 17 Oct. 67 ($401\,m^3\,s^{-1}$), 23 Mar. 68 ($342\,m^3\,s^{-1}$), 24 Apr. 71 ($270\,m^3\,s^{-1}$), 16 Aug. 71 ($307\,m^3\,s^{-1}$), 14 Aug. 71 ($307\,m^3\,s^{-1}$). In the preceding period there was only one flood exceeding $200\,m^3\,s^{-1}$; this was on 1 March 1963, well before the previous survey.

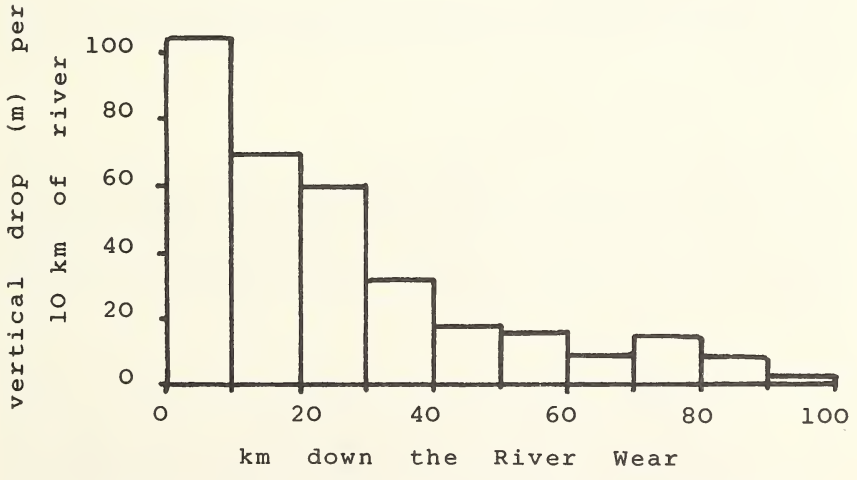


Figure 2. Vertical drop made by R. Wear in each 10 km downstream from Wearhead.

The level of key plant nutrients in general increases from source to mouth (Snow & Whitton, 1971). An account of the source of these various ions has been given by Beaumont (in press). Based on data in the Northumbrian River Authority reports and unpublished data held by us, it is possible to make some general comparisons of the lower non-tidal stretches of the Wear with those of the Tweed, Tyne and Tees, the stretches where most of the submerged angiosperms occur. In general the levels of the key nutrients are higher in the Wear and Tees than in the Tweed and Tyne, but the Wear carries higher levels of suspended solids than any of the other rivers (see below). Some data taken from the Northumbrian River Authority Reports to support this are shown in Fig. 3. The Wear is classified as 'clean' down to the entry of the Lumley Park Burn (km 88.1) according to the chemical classification of the Nurthumbrian Water Authority (1976), and 'doubtful' from this point downstream. Stretches of some lowland tributaries are 'poor' or 'grossly polluted'.

Although there have been no major changes in the physical or chemical features of the water in the main river since 1966, the following events are sufficiently marked that the possibility of a detectable effect on the vegetation must be considered.

(i) The average level of suspended matter resulting from opencast coal mining in the middle part of the catchment was probably greater in the last decade than in the previous one; however there was probably much more suspended matter from other sources in the previous decade. It seems likely that control measures imposed on opencast coal mining have resulted in decreased levels of suspended matter in the river in the last two years.

(ii) A sewage-works was opened at Brotherlee (km 7.4) in winter 1968/69. This works takes most of the sewage from the valley above this point, and as minor effluents have now ceased, it seems probable that the levels of key plant nutrients above km 7.4 are now lower than in 1966. A significant improvement has also taken place in the sewage-works at Vinovium (km 43.1) and in several discharges to tributaries (see below).

(iii) A moderate increase has taken place in activities associated with the old lead mines in the upper part of the catchment; almost all these activities are now concerned with the removal of fluorspar. This has almost certainly led to a slight increase in the total amounts of the heavy metals, zinc, cadmium and lead being transported by the river.

(iv) There was a detectable increase in the levels of zinc and lead in *Cladophora glomerata* in summer 1972 downstream of the effluent from Mullard's factory (km 73.6) as compared with this alga above the effluent.

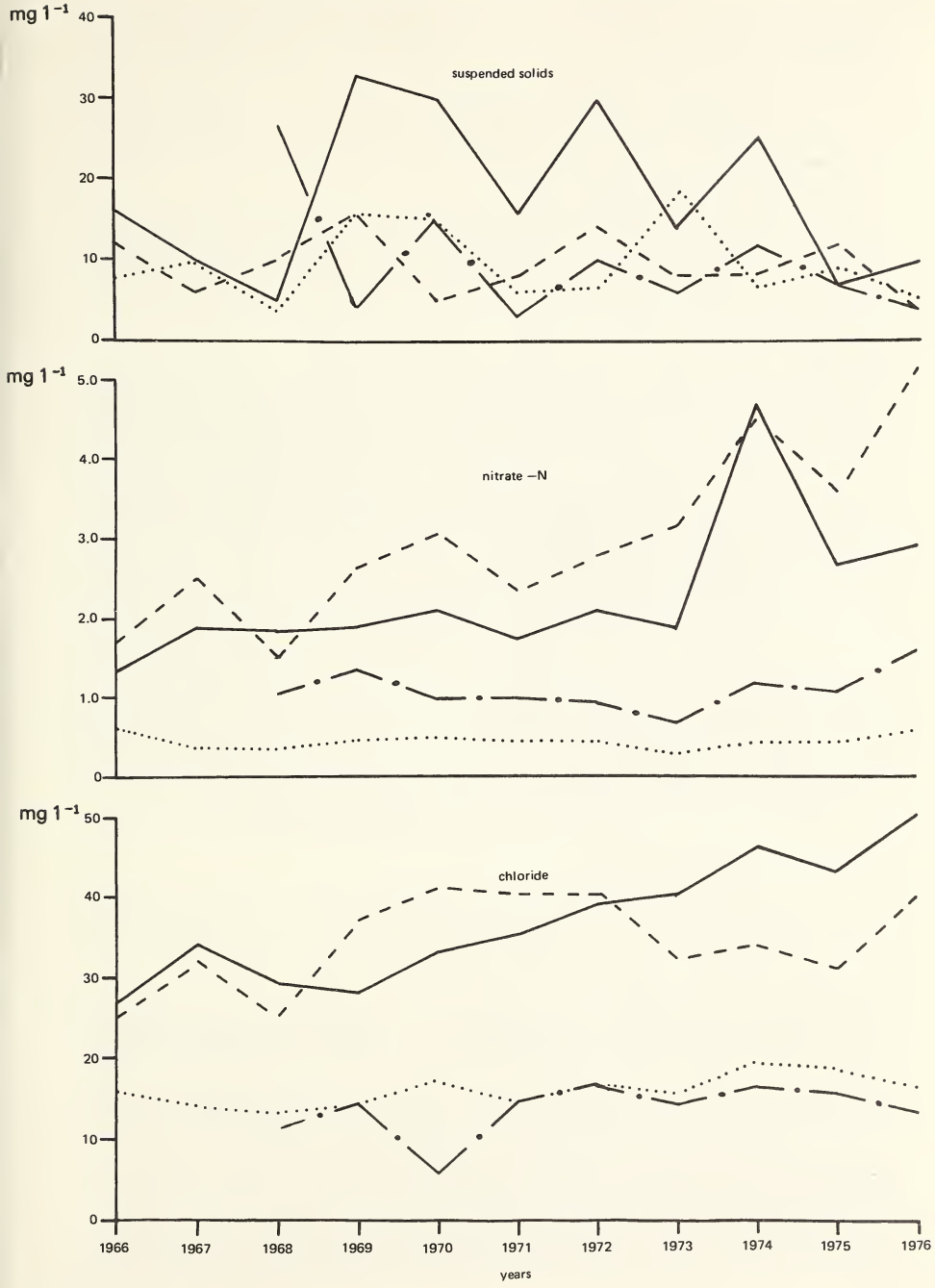
The most important changes in tributaries were decreases in pumped mine water reaching the R. Gaunless and improvements in the quality of several sewage effluents reaching the R. Browney.

Future Changes

(i) A major water transfer scheme, involving the Tyne, Wear and Tees, is due to come into operation not later than 1980 (Burston & Coats, 1975). This includes the building of a $2.01 \times 10^8\ m^3$ reservoir at the head of the North Tyne, and the intermittent transfer of water from the Tyne 14.4 km below the junction of the North and South Tyne rivers to the Wear below Stanhope (km 17.2). The transfer to the Wear is likely to be infrequent and only under conditions of low flow; any influence of Tyne water on the chemistry of the Wear is likely to

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Figure 3 (opposite page). Changes in suspended solids (dried to 105°C), nitrate — N and Cl from 1966–1976 for representative sites on the Tweed at Norham (— • —), Tyne at Wylam (.....), Wear at Cocken Bridge, km 80.6 (——) and Tees at Over Dinsdale Bridge (— —). Data based on annual average values (6–12 analyses; years ending 31st March) obtained by the Northumbrian River Authority and Northumbrian Water Authority.


mg l⁻¹
suspended solids
nitrate —N
chloride
years
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976

be small. However, in 1972 some macrophytes were known to be present in the Tyne system above the abstraction site which were almost certainly absent in the Wear (Holmes, Lloyd, Potts & Whitton, 1972).

(ii) An abstraction scheme, involving the removal of up to 10^6 m^3 day^{-1} at a site just above Chester-le-Street (km 87.3), comes into operation in 1978. The combined effect of the input of water at km 17.2 and the removal of water at km 87.3 means that after 1980 the minimum low flows between these two points will be higher than previously, while below km 87.3 they will be more or less the same as at present.

(iii) It seems likely that mining activities in the upper parts of the Wear catchment will continue to re-expand at a moderate rate, though the uncertainty about future needs for fluorspar makes prediction difficult. If expansion continues, there is likely to be still further rises in the levels of zinc, cadmium and lead entering tributaries such as Rookhope Burn and Bollihope Burn.

Methods

The 1976 survey was carried out by recording for selected 0.5 km lengths of the river details of the macrophytes present. Whereas the whole river was surveyed in 1966, the new survey included a total of 20 km. The middle 2 km was surveyed for each 10 km of river i.e. km 4.0/4.5, 4.5/5.0, 5.0/5.5, 5.5/6.0, 14.0/14.5 etc. (see Fig. 1). It is possible therefore to make a direct comparison between 1966 and 1976 records for a total of 40 lengths. The survey was carried out during June and early July 1976, before any effects of low flows resulting from drought became apparent. Most sites were visited about six weeks earlier than in 1966. Some observations made in the intervening years for the main river and some tributaries are also included. Details of these are given in the Results.

The floristic records made in 1976 were more detailed than those made in 1966, and some data are included here which can not be compared directly with previous data.

(i) Records were made of species growing on the 'bank' as well as in the main river. In general, the former refer to occurrences of plants that are submerged only periodically, while the latter refer to ones growing on parts of the substratum likely to be submerged for more than 85% of the year. A more detailed guide to the use of 'bank' and 'river' in river surveys has been given by Holmes and Whitton (1977). The 1966 survey included all 'river', but only the lower part of the 'bank' environment; some species are recorded therefore in the present study simply because of this vertical expansion of the survey.

(ii) Some indication was made for each 0.5 km length of the relative abundance of each macrophyte within that length for both 'bank' and 'river' (see Holmes & Whitton, 1977, and legend to Table II in present paper).

(iii) A check-list of possible macrophytic species was prepared before carrying out the 1976 survey. This list was drawn up in a similar way to that for a survey of the Tees in 1975 (Holmes & Whitton, 1977).

Results

The detailed distribution of species in the 0.5 km lengths surveyed in summer 1976 is given in Table II (in Appendix), while some of these results are compared with those for the same lengths in 1966 in Fig. 4. The probable reasons why certain records were made for 'river' species in 1976 but not 1966 are summarized in Table I. There were three species not noted in the 1976 survey which were listed for 1966. The records for *Drepanocladus aduncus* (Hedw.) Warnst. were almost certainly based on misidentification (of *Hygrohypnum ochraceum:* see below). The other two species which were not listed in 1976, *Enteromorpha flexuosa* and *Lemna minor* L., were frequent later in that summer, at an equivalent time to that when the 1966 survey was carried out.

Apart from those mentioned above, a few other 'river' species have been recorded from the main river. Later examination of material collected during the 1976 survey showed the presence of *Drepanocladus fluitans* (Hedw.) Warnst. (km 24.5), *Hygroamblystegium tenax*

(Hedw.) Jenn. (km 5.5) and *Scapania undulata* (L.) Dum. (km 4.5, 5.0). Of the 'river' algal macrophytes listed for the Tees (Holmes & Whitton, 1977), the following have also been found in the Wear. *Chamaesiphon fuscus* (Rostaf.) Hansg. *Stigeoclonium tenue* Kütz., *Ulothrix zonata* Kütz. In addition, *Draparnaldia plumosa* (Vauch.) Ag. has sometimes been found at upland sites in late spring; it is however present more consistently in several upland tributaries. Although thin green films and crusts on rocks have often been conspicuous, it was rarely possible to determine reliably the species responsible without microscopic study. Such green layers were abundant in the upper third of the Wear during the 1976 survey; microscopic examination usually showed the presence of *Gongrosira fluminensis* Fritsch. Visually obvious growths of *Phormidium* often develop in mid- and late summer over silt in the middle and lower stretches of the river; these growths were perhaps less conspicuous in the latter years of the decade than in the earlier ones.

Too few observations have been made on 'bank' species along the main river to comment on the likelihood of bryophytes or angiosperms being overlooked during the 1976 survey. However several other obvious algae have been noted from the banks. *Botrydium granulatum* (L.) Grev. has sometimes become locally abundant on banks of the lowland river in summer after a recent drop in river level (e.g. August 1968, May 1976). *Monostroma bullosum* (Roth.) Wittrock was recorded only from the banks of the Wear, although in the Gaunless it was observed in the river. Although *Porphyridium cruentum* Näg. is hardly a macrophyte, nevertheless it has been visually obvious throughout the whole decade under Lumley Bridge (km 87.8) on part of the right bank only occasionally submerged.

'River' angiosperms also occur in the lowermost stretches of the R. Gaunless and in parts of the R. Browney and Old Durham Beck, but these include no species not present in the main river. Although submerged angiosperms were not recorded for tributaries in 1966, it seems probable that they were also present then. There have however been increases in the amount of vegetation in the Gaunless and Browney; those in the Browney have been especially marked since the early 1970's, particularly in the unshaded reaches near Bearpark where there were large growths of *Callitriche* in 1976.

The following comments on individual species deal with all those from the main river listed for the 1966 survey, plus a few of those reported here for the first time (compare with Table I). The comments are intended merely to supplement those made previously (Whitton & Buckmaster, 1970). Comparisons with the Tweed are based on Holmes and Whitton (1975; data mostly for 1971-72), with the Tyne on Holmes *et al.* (1972; data mostly for 1972), with the Tees on Holmes and Whitton (1977; data mostly for 1975) and the Swale on Holmes and Whitton (1977a; data mostly for 1976).

Algae

Rhodochorton violaceum

This species has been observed in many years to be much more abundant than indicated for 1976 in Table II. It is usually most conspicuous in July and August, later than the survey in 1976. It is absent in the upper reaches of the river, and best developed in the lower middle reaches (e.g. Finchale, km 78.2). It is recognisable macroscopically as small globular thalli of dark red filaments on stones, or more typically, as an epiphyte on old stems of *Eurhynchium riparioides*.

Hildenbrandia rivularis

In 1976 *Hildenbrandia rivularis* was present at sites as far upstream and as far downstream as were included in the survey, but less frequent than might be expected by comparison with the Tweed, Tyne and Tees. It was absent from some sites where it might have been expected e.g. near Page Bank (km 54.0) and Shincliffe (km 65.7). It had apparently invaded large boulders at Finchale (km 78.2) by 1975 (Holmes & Whitton, 1975b) where previously it had been almost certainly absent in 1966-68. The comparatively small development of *H. rivularis* in the Wear, combined with an apparent recent increase in some lower reaches, is probably due to several factors (see Discussion).

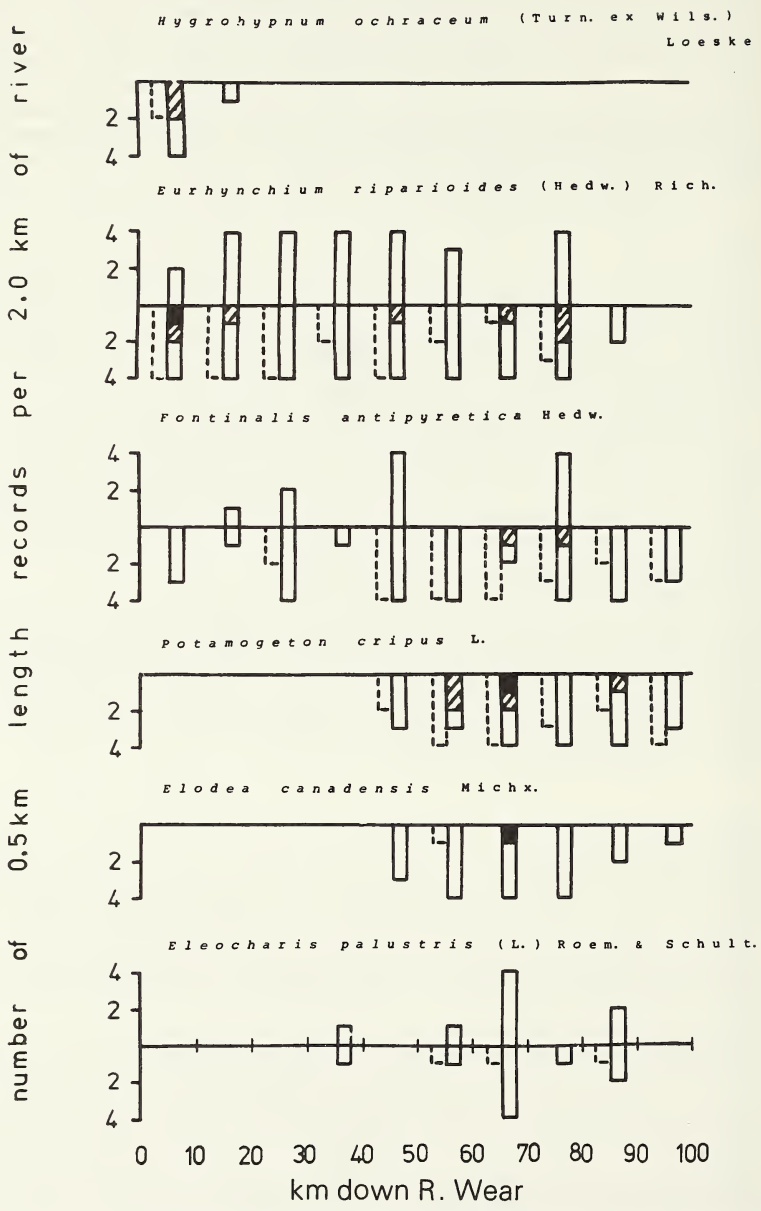
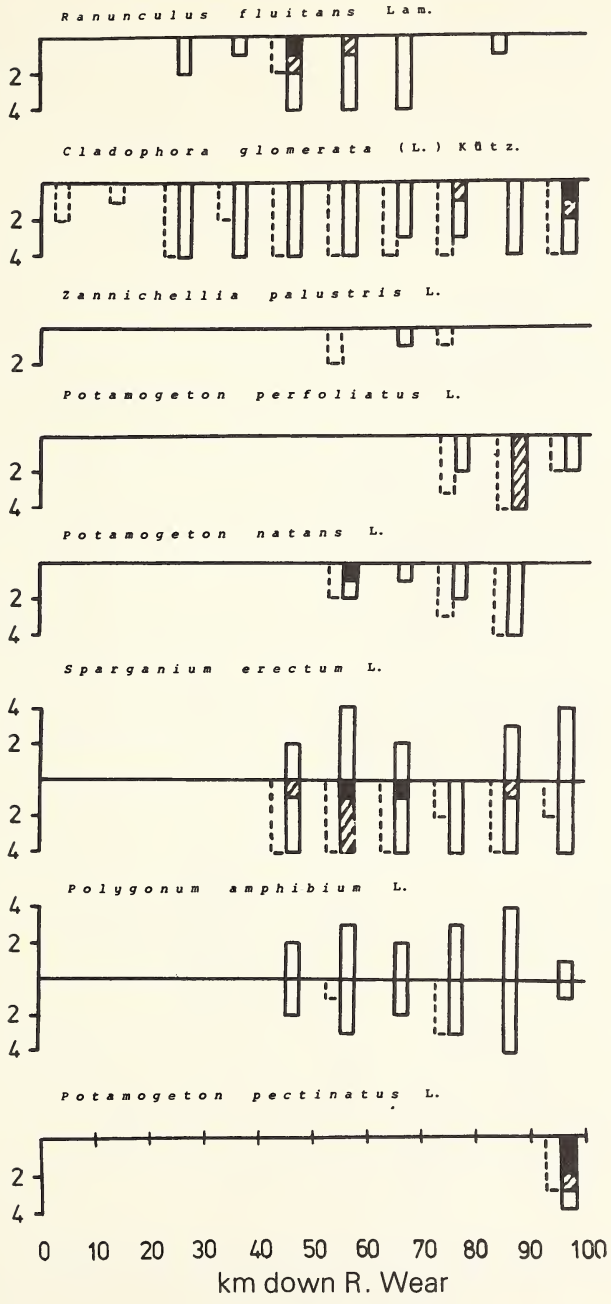
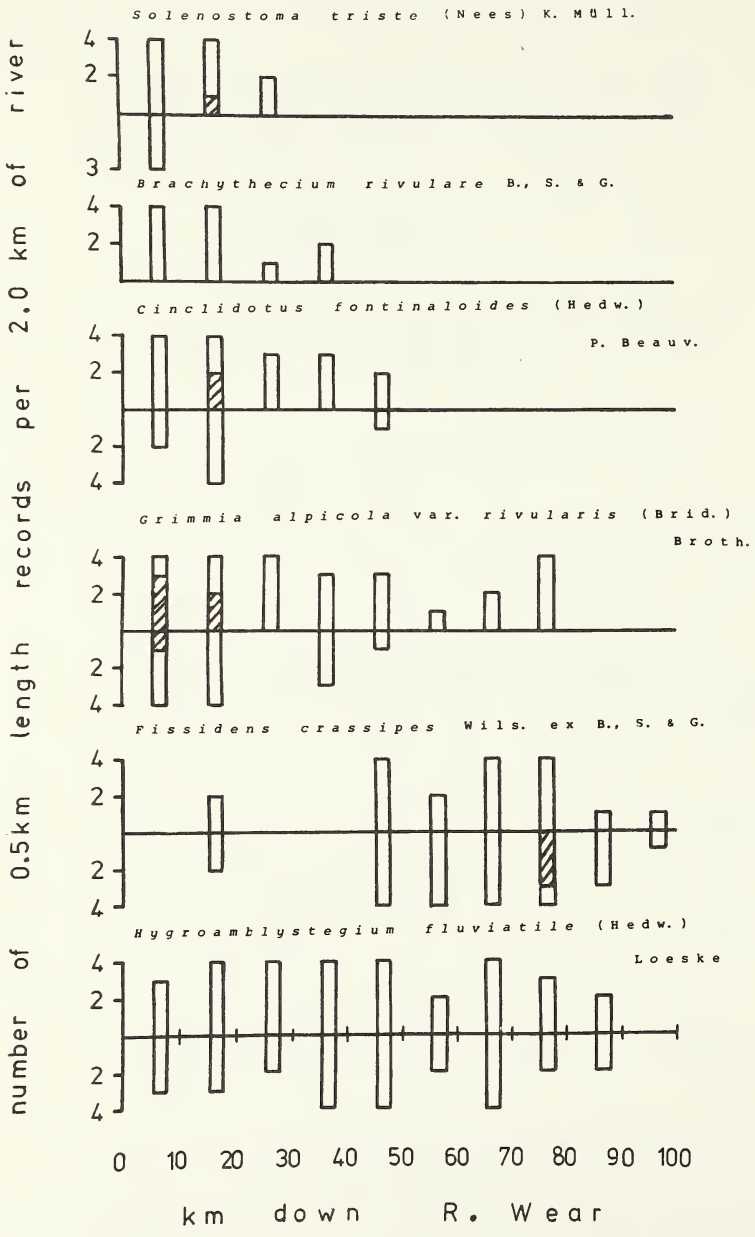


Figure 4. Comparison of distributions of macrophytes in 1966 (dotted line) and 1976 (full line) for the same 10 sites (40 lengths). Estimates of area cover are included for 1976: □ < 0.1% ▨ = 0.1–1% ■ > 1%.


Ranunculus fluitans Lam.
Cladophora glomerata (L.) Kütz.
Zannichellia palustris L.
Potamogeton perfoliatus L.
Potamogeton natans L.
Sparganium erectum L.
Polygonum amphibium L.
Potamogeton pectinatus L.
2
4
0 10 20 30 40 50 60 70 80 90 100
km down R. Wear


Solenostoma triste (Nees) K. Müll.
Brachythecium rivulare B., S. & G.
Cinclidotus fontinaloides (Hedw.) P. Beauv.
Grimmia alpicola var. rivularis (Brid.) Broth.
Fissidens crassipes Wils. ex B., S. & G.
Hygroamblystegium fluviatile (Hedw.) Loeske
number of 0.5km length records per 2.0 km of river
0 10 20 30 40 50 60 70 80 90 100
km down R. Wear

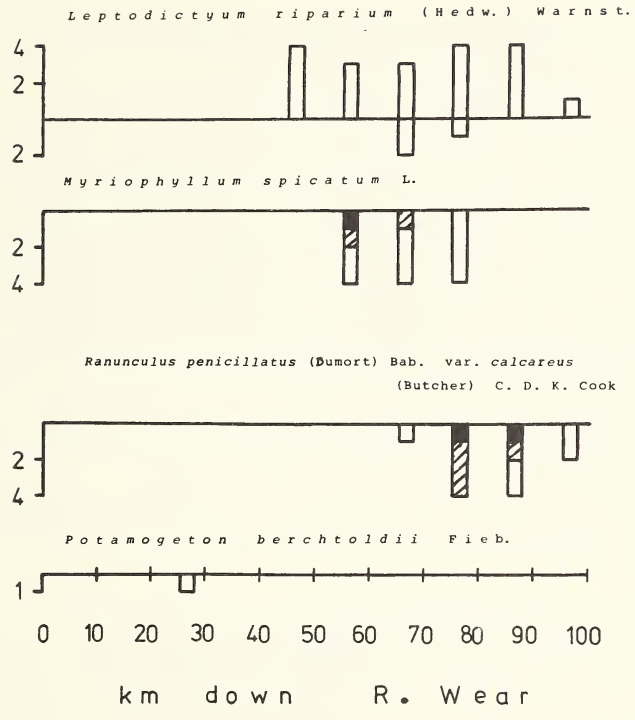


Figure 5. Distribution in 1976 of those macrophytes discussed in the account of the 1966 survey which at that time were either not fully surveyed or not recorded. Estimates of area cover: □ < 0.1% ▨ = 0.1–1% ■ > 1%.

Vaucheria sessilis
V. sessilis produces the largest crops in relatively fast-flowing stretches of the lower, but not brackish, reaches (e.g. Finchale, km 78.2). The size of peak crops varies markedly from year to year, and within the decade under consideration were largest in July-August 1973; during this period many plants produced filaments over 1 m long. In addition to *V. sessilis*, three other species of *Vaucheria* have been recorded just downstream of the lowermost length surveyed in 1976 (see 'Floristic literature').

Heribaudiella fluviatilis
The species had been overlooked in the Wear before the survey and it is much less frequent than in the Tweed, Tyne, Tees or Swale.

Spongilla lacustris
The freshwater sponge is included here because of the usual association with *Chlorella (Zoochlorella parasitica)*. It is occasional from below the entry of the R. Gaunless to Fatfield, in general being most conspicuous on weirs. It occurs also on rocky substrata, often in shaded situations; material from the underside of such rocks usually lacks green colour.

Enteromorpha flexuosa (Wulf. ex Roth.) J. Ag. ssp. *pilifera* (Kütz.) Bliding
The absence of macroscopic growths of this alga in June 1976 was exceptional; it had been noted by this time in every other year since 1966. It did however become frequent at many sites in July 1976. The furthest upstream record was in 1969 in km 37.0/37.5. The population in the river was particularly high in summer 1970 (Allen, 1970) following a long period of low river flows in May and June. Allen (1970) also recorded morphological details of this alga taken from the Wear. The alga often exceeded 1 m in length and a maximum of 5 m was recorded. Branches ($\geqslant$ 0.5 cm) were present in 30% of specimens more than 20 cm long from km 78.2 and 50% of specimens more than 20 cm long from km 88.3.

Enteromorpha intestinalis
This species is occasional in the upper tidal reaches, but becomes more frequent on passing downstream.

Cladophora aegagropila
This species is rare and before the present survey was overlooked.

Cladophora glomerata
The absence of upstream records in 1976 apparently represents a real difference from 1966, and is discussed below.

BRYOPHYTES

Solenostoma triste (= *Jungermannia tristis* Nees)
The frequency of this species was probably underestimated in 1966, nevertheless it was less frequent in the Wear in 1976 than has been found previously for the Tyne and Tees.

Eurhynchium riparioides
The increased records in 1976 are probably due to the survey being carried out earlier in the year. *E. riparioides* looses many of its leaves in late summer and can be inconspicuous when mixed with larger macrophytes.

Fissidens crassipes
The occasional presence of this species in the upper reaches of the river was probably overlooked in 1966.

Fontinalis antipyretica
The increased records in 1976 for the upper stretches of the river apparently represent a real difference, although there is no obvious hypothesis which might explain it. While there is no evidence to show that there has been a decrease in amounts of *F. antipyretica* in the middle and lower stretches, it is among the species most likely to be influenced by the spread of *Ranunculus penicillatus* var. *calcareus* (see below). The distribution of *F. antipyretica* in the Wear differs markedly from that in the Tweed, Tyne and Tees. In the Wear the species is rare

in the upper reaches and increases on passing downstream. In the other three rivers it is abundant in the upper reaches, less abundant in the middle and then becomes more abundant again in the lower reaches.

Fontinalis antipyretica var. *gracilis*
The rarity of this species in 1976 implies that it might well have been overlooked altogether in 1966. However it was recorded at one site (Finchale) in 1976 where it was almost certainly absent in 1966-68.

Hygrohypnum ochraceum
This was recorded as *Drepanocladus aduncus* in 1966; the species was probably more frequent in 1976 than in 1966.

Leptodictyum riparium
This species was never found in the Wear above the entry of the R. Gaunless.

ANGIOSPERMS

Eleocharis palustris
This species was almost certainly more frequent in 1976 than in 1966.

Elodea canadensis
This species was certainly more frequent in 1976 than in 1966; increases became visually obvious at several sites during the early 1970's.

Potamogeton berchtoldii
This record of *P. berchtoldii* at Wolsingham is the first for the Wear; such a small plant could however have been overlooked easily in the past. Although the death of J. E. Dandy means that identification could not be verified, the presence of internodal glands and tubular stipules are sufficient to separate it from *P. pusillus.*

Potamogeton crispus
Although there was a slight difference between the actual lengths from which this species was recorded in the two surveys, there has been no indication of obvious change in abundance.

Potamogeton natans
The distribution down the river was apparently similar in the two surveys; it seems probable that this species has become more abundant during the decade at certain sites e.g. Lumley Bridge (km 87.9).

Potamogeton pectinatus
The distribution of this species down the river was apparently similar in the two surveys, although it is more restricted than in the Tweed, Tees and Swale (but not the Tyne, from which it is absent).

Potamogeton perfoliatus
The longitudinal distribution of this species down the river was apparently similar in the two surveys; like *P. natans,* there has probably been some increase in abundance at some sites e.g. Durham (km 69.4–69.8), Lumley Bridge (km 87.7–87.9). It was recorded in 1943 (Heslop-Harrison, 1943) from Willington, a site not included in the 1976 survey, but apparently similar to one noted by Whitton and Buckmaster in 1966 (see km 50.0–50.5 in their Table: omitted from figure in error). *P. perfoliatus* was found to be variable in appearance, apparently more so than it is in the Tweed. The presence of morphological forms which sometime approach *P.* x *cooperi (P. perfoliatus* x *P. crispus)* perhaps explains the record of this hybrid made by Heslop-Harrison (1944).

Zannichellia palustris
This species was apparently less frequent in the main river in 1976 than in 1966, though it may have increased in amounts in some tributaries. The decrease appears at least in part to be due to increased competition in the main river from *Potamogeton natans* and perhaps also *P. crispus.*

Callitriche spp.
Callitriche was not recorded from the main river in 1966, and there has certainly been a large increase since then. Both *C. platycarpa* Kütz. and *C. stagnalis* Scop. were present in 1976 but the survey was carried out too early for the presence of fruits required to separate the species. It seems probable that *C. platycarpa* predominates in the middle stretches and *C. stagnalis* in the lower stretches.

Mimulus sp.
Hybrid populations of *Mimulus* are especially evident in the Wear, with both *M. guttatus* x *luteus*, *M. guttatus* x *cupreus* and *M. guttatus* x *luteus* x *cupreus* present in addition to type *M. guttatus*. (*M. luteus*, but not *M. cupreus*, has been recorded elsewhere in the British Isles; R. H. Roberts. pers. comm.). Both *M. guttatus* and the hybrid forms occur in both river and bank habitats, but the former is relatively more of a 'river' macrophyte than are the latter.

Myriophyllum spicatum
This species was almost certainly more frequent in 1976 than in 1966.

Ranunculus fluitans
There has been a marked increase in the frequency of *R. fluitans*, including a further spread downstream. Although the species is still rare in the stretch immediately downstream of Frosterley, it is still present just below the bridge there (km 19.1) at exactly the same place as first planted in 1959 by S. Pepper.

Ranunculus penicillatus var. *calcareus*
The abundance of this species in 1976 in the lower half of the river is the biggest contrast between the two surveys. It was almost certainly absent from the main river in 1966, though it seems probable that a small population has always been present in the upper part of the R. Browney. The species was first noted in the main river in 1970, when a few plants were found just upstream of Finchale (km 77.9). It was noted at a few other sites in 1971, and has since spread so rapidly that by 1976 it was the dominant macrophyte at many lower river sites. Its distribution in the Wear, involving a downstream abundance combined with an absence from more upstream stretches where *R. fluitans* is present, provides a contrast not only with the relative distribution of these two species in the Tweed, Tees and Swale, but apparently also with those rivers in mainland Europe where both occur (see for example Cook, 1966; Turala, 1970).

Discussion

A number of differences were apparent between the populations of macrophytes in the main river in 1966 and 1976. In some cases differences in abundance are probably not a reflection of long-term changes, but simply a feature of species which vary greatly in standing crop from year to year for reasons which are not at present clear (e.g. *Vaucheria sessilis*, *Enteromorpha flexuosa*). In contrast, other species have been observed to increase during the decade, mostly at downstream sites: invasion and rapid spread of *Ranunculus penicillatus* var. *calcareus* and *Callitriche* spp., spread and increase of *R. fluitans*, increase of *Eleocharis palustris*, *Elodea canadensis*, *Potamogeton natans*, *P. perfoliatus* and *Myriophyllum spicatum*.

The environmental data summarized earlier are too scant to permit any critical evaluation of the reasons for these increases. Nevertheless, so little is known about long-term changes in the vegetation of rivers, some attempt will be made to suggest the factors likely to have been important over the decade 1966-76. As there have been more very large floods than in the previous period, it seems most unlikely that increases in amounts of these species are due to hydrological changes in the river. It seems unlikely that the average levels of suspended matter were lower for most of the decade than they were at the beginning of the period, though they were probably lower than the average levels during the 1950's. It seems probable therefore that many of the increases may be associated with the long-term expansion of plant

populations taking place since the period of peak pollution from the coal industry, rather than with changes associated with improving environmental conditions during the actual decade of study. The other factor which seems most likely to be of importance is the provision of increased inocula of certain species from the Gaunless and Browney, which may be expected to come from the increased growths in these rivers, which in turn result from improved growth conditions there. This latter factor seems in particular likely to have favoured the expansion of *Callitriche* spp. and *Ranunculus penicillatus* var. *calcareus* in the main river. The latter species has spread so rapidly since 1970 that it seems remarkable that it did not invade the river in the early 1960's; the only obvious explanation is that increased growths in the Browney have increased the statistical probability of populations becoming established in the main river.

Two obvious decreases were noted. The fewer records of *Cladophora glomerata* in the upper-most part of the river may have been due to a reduction in levels of key nutrients, such as phosphate, with the removal of several small sewage effluents. However the possibility that increased levels of heavy metals might also play a role must be considered, in view of the sensitivity of this species to heavy metals (Whitton, 1967). The decrease in *Zannichellia palustris* is probably due to increased competition from other species; either *Z. palustris* was more frequent in the past because it was less sensitive to coal industry pollution than some other species, or it was able to invade the river more rapidly when pollution decreased.

The longer-lived encrusting algae and some bryophytes (e.g. *Hygrohypnum* spp.) are less frequent in the upper Wear than in the Tweed, Tees or Swale. The reason for this is probably because sheet rock and large boulders form a smaller proportion of the substratum of the Wear than of the other rivers. The rarity of some species in the lower reaches may however be due in part to some aspect of pollution in the Wear, while the increase in *Hildenbrandia rivularis* is probably in some way associated with decreased pollution. There are two different aspects of pollution which seem likely to have influenced *H. rivularis*, suspended matter such as coal dust, and the hard brown film, which is apparently associated with the deposition of manganese dioxide as a result of the presence of pumped mine waters. As there is no indication of a decrease in suspended matter between 1966 and 1971, the period during which this alga was first found, it may suggest that its recovery from the previously worse conditions is very slow. However it seems probable that there has been a slight decrease in the deposition of a brown crust since 1966, so this may be the main factor favouring its increase.

In 1970, Whitton and Buckmaster (1970) followed the advice of Edwards (1969) and hazarded a guess as to possible future changes in the macrophyte populations. Some, but not all, of those which were predicted have in fact now happened. *Ranunculus fluitans* has increased and *Potamogeton perfoliatus* has spread further away from the banks. *Callitriche* sp(p). and *Myriophyllum spicatum* have also increased. However there has been no upstream spread of *Potamogeton perfoliatus*. It seems probable that a still further increase will take place in the growths of the two *Ranunculus* species, leading to the two growing together over part of the river, and possibly the eventual reversal of their present-day distribution.

Further changes in the macrophytes seem likely when the various changes in river management take place.

(i) The transfer of Tyne water to the Wear is likely to influence the vegetation in the latter in two main ways: an increase in minimum flows below the entry, transfer of inocula of species not present in the Wear. It is at present difficult to make any prediction about the likely effects of the former, as most previous studies of river regulation involve situations where there are also decreases in maximum flows. Of the species reported by Holmes *et al.* (1972) to be present in the Tyne but not the Wear (see Introduction), *Hildenbrandia rivularis* has now been found in the Wear. The three flowering plants, *Potamogeton* x *nitens*, *P. pusillus* and *Myriophyllum alterniflorum*, are all possible invaders, but none seems likely to develop large populations. The invasion of *Potamogeton* x *nitens* would provide a particularly interesting study of competition, as this hybrid appears to occupy a rather similar ecological niche in the Tyne to that by *P. perfoliatus* in the Wear.

(ii) The most likely effect of any decrease in river flows below the Lumley abstraction point

would seem to be an increase in the size of *Potamogeton pectinatus* crops, thus increasing the need for the Northumbrian Water Authority to cut 'weed'.

(iii) In view of the abstraction of water at Chester-le-Street, it seems unlikely that levels of heavy metal pollution will ever be allowed to rise sufficiently to have marked effects on the vegetation of the main river. However the possibility can not be ruled out of the levels rising sufficiently to reduce the populations of sensitive algae such as *Cladophora glomerata* and *Ulothrix zonata* in the Frosterley to Wolsingham stretch.

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APPENDIX

TableI. Summary of 'river' species in the main river listed for 1976 but not for 1966

(i) Apparent invasion

Hildenbrandia rivularis
Ranunculus penicillatus var. *calcareus*
Potamogeton berchtoldii

(ii) Not treated as macrophyte in 1966

Rhodochorton violaceum
Chamaesiphon fuscus
Tolypothrix penicillatus
Pseudochantransia sp.
Haematococcus lacustris
Spongilla lacustris
Gongrosira incrustans
Stigeoclonium sp.
Ulothrix zonata
Verrucaria spp.

(iii) Probably overlooked in 1966

Cladophora aegagrophila
Fontinalis antipyretica var. *gracilis*
Hygrophypnum luridum
Hygrohypnum ochraceum
Glyceria declinata
Glyceria fluitans

(iv) Not listed in 1966 because predominantly on bank

Brachythecium plumosum
Dichodontium pellucidum var. *flavescens*
Grimmia alpicola var. *rivularis*
Orthotrichum anomalum
Philonotis fontana
Equisetum fluviatile
Carex hirta var. *sublaevis*
Iris pseudacorus
Juncus acutiflorus
Juncus effusus
Phalaris arundinacea
Caltha palustris
Mentha aquatica
Mimulus sp.
Myosotis scorpioides
Rorippa nasturtium-aquaticum
Rorippa sylvestris
Cochlearia officinalis
Veronica beccabunga
Epilobium hirsutum
Impatiens glandulifera
Petasites hybridus
Solanum dulcamara
Stachys palustris
Lysimachia vulgaris
Cardamine amara
Angelica sylvestris
Apium graveolens
Oenanthe crocata

Table II (overleaf). Primary data for each of the 40 lengths surveyed in 1976; Data for the 'river' and 'bank' have been separated. The first number in each column refers the relative abundance of that particular species in relation to others within the same length. The second figure is an estimation of the area covered by that species within that length using the scale

1 = < 0.1% 2 = 0.1–1.0% 3 = 1–5% 4 = 5–10% 5 = > 10%

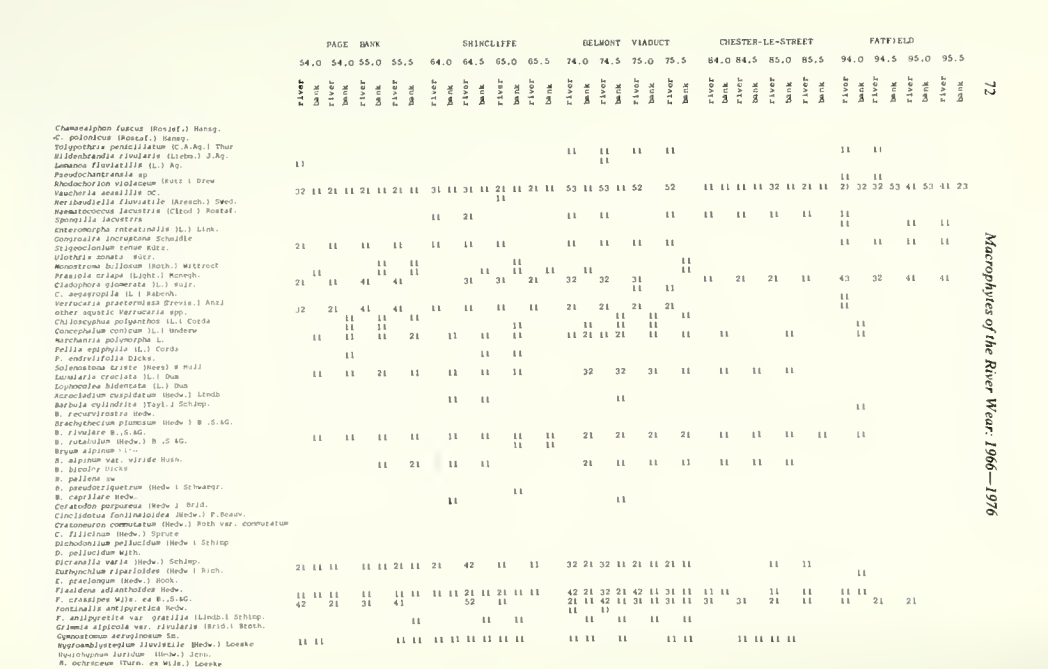
	WESTGATE						STANHOPE						WOLSINGHAM						WITTON-LE-WEAR						BISHOP AUCKLAND					
	4.0		4.5		5.0		5.5		14.0		14.5		15.0		15.5		24.0		24.5		25.0		25.5		34.0		34.5		35.0		35.5	
	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank	river	bank
Chamaesiphon fuscus (Rostaf.) Hansg.	21	11	11		11		11				11		11												11		31	11	31	21	31	31					11	11	11	11
C. polonicus (Rostaf.) Hansg.	32	11	31	11	11	11	21	21	11		21	11	21	11	21	11	11	11	11	11					11	11	21	11	11	21	11	21					11	11	11	11
Tolypothrix penicillatus (C.A.Ag.) Thur.	11				11		11						11		11																								
Hildenbrandia rivularis (Liebm.) J.Ag.					11				11		11		11		11																								
Lemanea fluviatilis (L.) Ag.	42		52		52		52		52		52		52		51		53		52		51		51		41		11		11		11		11		11		11	
Pseudochantransia sp.	11				11		11				11		11																									
Rhodochorton violaceum (Kütz.) Drew																																						
Vaucheria sessillis DC.		11															11	11		11	11	11		11	11			11	11	11	11		11	11	21	11			
Heribaudiella fluviatile (Aresch.) Sved.					11				11		11		11		11										11				11		11				11			
Haematococcus lacustris (Girod.) Rostaf.		21		11						11								11		11		11																
Spongilla lacustris																																			11			
Enteromorpha intestinalis (L.) Link.																																						
Gongrosira incrustans Schmidle																	11		11						21		11		31		41		11		21		21	
Stigeoclonium tenue Kütz.	11				11						11										11		11		41		41		11		21		11		11		11	
Ulothrix zonata Kütz.			11								11																											
Monostroma bullosum (Roth.) Wittrock.																		11				11		11		11												
Frasiola crispa (Light.) Menegh.																		11		11		11		11														
Cladophora glomerata (L.) Kütz.																	21		31		31		31		41		41		31		31		31		31		21	
C. aegagropila (L.) Rabenh.																																						
Verrucaria praetermissa (Trevis.) Anzi																	21	21	11	11	11	11	11	11	21	21	11	11	11	11	11	11	11	11	11	11	11	11
other aquatic *Verrucaria* spp.	32		31		41		41		41		42		51				53		41		51		31		41		41		51		51		31		21		41		31	
Chiloscyphus polyanthos (L.) Corda		11		11		11		11				11		11							11					11		11		11				11				
Concephalum conicum (L.) Underw.		11		11		11		11		11		11		11					21		21		11			21		11		21		21		11		11		11
Marchantia polymorpha L.		11		11		11		11		11		11		11				21		21		21		21		11		21		21		31		31		21		21
Pellia epiphylla (L.) Corda		21		11		11				11		11		11												11				11						11		
P. endiviifolia Dicks.																				21		21		11										11		11		
Solenostoma triste (Nees) K.Müll.	11	21	11	21	11	21		11		42		21		11		11						11		11														
Lunularia cruciata (L.) Dum.																		11		11		11		11		11		11		11		31		21		11		11
Lophocolea bidentata (L.) Dum.																																						
Acrocladium cuspidatum (Hedw.) Lindb.		11		11		11		11					11		11							11				11		11										
Barbula cylindrica (Tayl.) Schimp.		11		11		11		11		11		11		11				11		11		21		11		11				11				11				
B. recurvirostra Hedw.		11				11		11		11																11												
Brachythecium plumosum (Hedw.) B.,S.&G.	11	42	11	42		21		52	11	11		11		11		11									11	11												
B. rivulare B.,S.&G.		11		11		11		11		11		11		11		11				11						11				11								
B. rutabulum (Hedw.) B.,S.&G.																		31		21		21		11		11		11		11		11		11		21		21
Bryum alpinum With.				11		11		11														11																
B. alpinum var. *viride* Husn.		11																																				
B. bicolor Dicks.				11						11		11		11		11		21		21		31		21		21		11		21		21		11		11		11
B. pallens sw.		11		11		11		21						11		11		31		21		11		11		11												
B. pseudotriquetrum (Hedw.) Schwaegr.		21		21		21		21		11		21		11		11				11		11																
B. capillare Hedw.														11		11		11		11		11		11		11												11
Ceratodon purpureus (Hedw.) Brid.		11						11						11		11		11		11		11																
Cinclidotus fontinaloides (Hedw.) P.Beauv.	11	11	11	11	11	11		11	11	52	21	52	11	31	11	21		11		11		11				11				11				11	11			11
Cratoneuron commutatum (Hedw.) Roth var. *commutatum*		11				11				11																												
C. filicinum (Hedw.) Spruce		21		21		11		21		11		11		11		11		11		11		21		21		11		11		11						21		11
Dichodontium pellucidum (Hedw.) Schimp.		21		21		21		21		11		11		11		11		11										11								11		
D. pellucidum With.	11	21		21		21		31																														
Dicranella varia (Hedw.) Schimp.		11						11																														
Eurhynchium riparioides (Hedw.) Rich.	53		52		41	11	41	31	31	11	41	21	52	11	51	21	31	21	21	11	31	21	31	11	41	21	11	21	21	21	21	31	11	21	11	21	31	21	42	31
E. praelongum (Hedw.) Hook.																																						
Fissidens adianthoides Hedw.																									11													
F. crassipes Wils. ex B.,S.&G.									11	11					11	11															11	11	11	11	21	21	11	11
Fontinalis antipyretica Hedw.	11		11		11				11	11							11		11		21	11	11	11	11						21	11	21	11	41	11	31	11
F. antipyretica var. *gracilis* (Lindb.) Schimp.																																						
Grimmia alpicola var. *rivularis* (Brid.) Broth.	32	52	21	52	11	41	11	42	11	42	11	42	11	31	11	21		21		11		21		11	11	21		11	21	11	21			11		11	21		11
Gymnostomum aeruginosum Sm.		11						11																														
Hygroamblystegium fluviatile (Hedw.) Loeske	11	11			11	11	11	11	11	11	11	11	11	11		11	11	11		11		11	11	11	21	21	11	11	11	21	11	11	11	21	11	31	11	31
Hygrohypnum luridum (Hedw.) Jenn.	11	11	11	11	11	11	11	11	11	11	11	11	11												11	11												
H. ochraceum (Turn. ex Wils.) Loeske	42		42		21		21				11																											

	WESTGATE						STANHOPE						WOLSINGHAM						WITTON-LE-WEAR						BISHOP AUCKLAND					
	4.0		4.5		5.0		5.5		14.0		14.5		15.0		15.5		24.0		24.5		25.0		25.5		34.0		34.5		35.0		35.5		44.0		44.5		45.0		45.5	
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Leptodictyum riparium (Hedw.) Warnst.																																11		11		21		31
Mnium longirostrum Brid.		11		11		11		11		11		21		11		11		21		11		11		11		11		11				11		11		11		11
M. punctatum Hedw.		11		11				11																														
M. hornum Hedw.																										11												
Orthotrichum anomalum Hedw.	21	42	21	31		11		11				11		11		11								11														
Philonotis fontana (Hedw.) Brid.	11	32		21		21		21										21		11		11		11														
Pohlia delicatula (Hedw.) Grout										11										11				11		11		11				11		11		11		11
P. natans (Hedw.) Lindb.																																						
Thamnium alopecurum (Hedw.) B.S.&G.																					11																	
Tortula latifolia Hartm.																					11				11										11			
T. muralis Hedw.																																						
Funaria hygrometrica Hedw.												11		11						11		11		11								11						
Equisetum fluviatile L.	11	11	11	11	11	11	11	21	11	11	11	11	11	11			11	11	11	21	11	21	11	11				11	11	11		11	21	11	21	11	11	11	11
Carex hirta L. var. *sublaevis* Hornem.																																11	11	11				
Carex nigra (L.) Reichard	11	11				11																																
Eleocharis palustris (L.) Roem. and Schult.																	11	21																11	11	11	11	
Elodea canadensis Michx.																															11		41		11		11	
Glyceria declinata Breb.																																						
Glyceria fluitans (L.) R.Br.	11	11	11	11	11	11	11	11	11	11	11	11					11	11	11	31	11	11	11	11							11	11						
Iris pseudacorus L.																																	11	11				
Juncus acutiflorus Hoffm.	11	21	11	21	11	11	11	21	11	11	11	11	11	11	11	11	11	31	11	?1	11	21	11	21	11	21	11	21					11	11	11	11	11	11
J. effusus L.										11										11		11				11								11				
J. inflexus L.																	11																	11				
Phalaris arundinacea L.					11	11	11	11									11	11	11	21	11	21	11	21	11	11	11	21	11	21	11	11	31	21	11	21	21	42	21	52
Potamogeton berchtoldii Fieb.																	11																					
P. crispus L.																															51		31		11			
P. natans L.																																						
P. pectinatus L.																																						
P. perfoliatus L.																																						
Scirpus lacustris L.																																						
Sparganium erectum L.																															51	11	31		52	11	21	
Zannichellia palustris L.						52								32		52				51				51				32		51		51		52		52		52
monocotyledons, non-binomials																																						
Callitriche platycarpa Kütz.																																						
C. stagnalis Scop.	11	21	11	21	11	21	11	21	11	11	11	21	11	21	11	21		11	11	11		11		11		11						11						
Caltha palustris L.				11								11		11				11				11				11										11		
Filipendula ulmaria (L.) Maxim.		11		11	11	11	11	11		11	11	11	11	11	11	11	11	21	11	21	11	21	11	21	11	31	31	21	11	21	11	21	11	21	11	21	11	21
Mentha aquatica L.	11	21	11	21	11	21	11	21	11	21	11	21	11	31	11	31	11	31	11	41	11	41	11	31	11	31	21	31	11	21	11	31	11	21		11	11	21	11	21
Mimulus guttatus DC.							11			11		11		11							11		11			11		21		11									
M. cupreus x guttatus		11		11		11		11				11		11		11	11		11		11	11	11		11	21	21	21	11	21	21	21		21		11	11	21	11	11
Myosotis scorpioides L.												11																											
M. secunda A. Murr.																																						
Myriophyllum spicatum L.																															11	11	11	11				
Polygonum amphibium L.																	31					11						11			51		51		52		52	
Ranunculus fluitans Lam.																																						
R. penicillatus var. *calcareus* Butcher C.D.K. Cook																									11	21	21	21	11	21		11		11	11	11	11	
Rorippa nasturtium-aquaticum (L.) Hayek																												11	11	21				11	11	21		
R. sylvestris (L.) Besser																																						
Cochlearia officinalis L. ssp. *alpina* (Bab.) Hooker		11		11		11	11	11										11	11	21					11	21	11	21	11	21	11	11		11		11	11	11	11
Veronica beccabunga L.		11	11	11	11	21	11	11		11		11	11	11			21	52	21	51	11	21	11	31		11	11	11	11	21	11	11	21		11	11	21	11	21
Epilobium hirsutum L.																		11		21		11		11		21		21		41		41		21		21	11	52		42
Impatiens glandulifera Royle																	21	52		41	21	51	11	41	11	21	11	41	11	41	11	31	11	11		11	11	31	11	21
Petasites hybridus (L.) Gaertn., Mey. & Scherb.		11	11	11						11		11		11																						11	11	
Solanum dulcamara L.					11	11		11				11		11		11																				11		
Stachys palustris L.																																				11	11	
Lysimachia vulgaris L.	11	11	11	11	11	21	11	11	11	21	11	21	11	21		11										11		11		11			21	11	21			
Cardamine amara L.																	11	11	11	11		11		11														
Angelica sylvestris L.																																						
Oenanthe crocata L.																										52				51		51		52				
dicotyledons , non-binomials																																						

WESTGATE
STANHOPE
WOLSINGHAM
WITTON-LE-WEAR
BISHOP AUCKLAND
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river bank
Chamaesiphon fuscus (Kostat.[Hansg.
C. polonicus (Postaf.[Hansg
Tolypothrix penicillata (C.A.Ag.[Thur.
Hildenbrandia rivularis (Liebm.[J.Ag.
Lemanea fluviatilis (L.[Ag.
Pseudochantransia sp.
Rhodochorton violaceum
Vaucheria sessilis DC
Vaucheria dichotoma (L.) Mart.
Vaucheria geminata (Vauch.) DC
Vaucheria piloboloides Thuret
Vaucheria terrestris Lyngb.
Vaucheria sessilis (Vauch.)

	PAGE BANK				SHINCLIFFE						BELMONT VIADUCT				CHESTER-LE-STREET						FATFIELD							
	54.0		54.0		55.0		55.5		64.0		64.5		65.0		65.5		74.0		74.5		75.0		75.5		84.0		84.5		85.0		85.5		94.0		94.5		95.0		95.5	
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Chamaesiphon fuscus (Rostaf.) Hansg.																																						
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Lemanea fluviatilis (L.) Ag.	11																		11																			
Pseudochantransia sp.																																						
Rhodochorton violaceum (Kütz.) Drew																															11		11					
Vaucheria sessillis DC.	32	11	21	11	21	11	21	11	31	11	31	11	21	11	21	11	53	11	53	11	52		52		11	11	11	11	32	11	21	32	32	53	41	53	41	23
Heribaudiella fluviatile (Aresch.) Swed.													11																									
Haematococcus lacustris (Girod.) Rostaf.																																						
Spongilla lacustris									11		21						11		11				11		11		11		11		11							
Enteromorpha intestinalis (L.) Link.																															11				11		11	
Gongrosira incrustans Schmidle																																						
Stigeoclonium tenue Kütz.	21		11		11		11		11		11		11				11		11		11		11								11		11		11		11	
Ulothrix zonata Kütz.																																						
Monostroma bullosum (Roth.) Wittrock.					11		11						11										11															
Prasiola crispa (Light.) Menegh.		11			11		11				11		11		11			11					11															
Cladophora glomerata (L.) Kütz.	21		11		41		41				31		31		21		32		32		31				11		21		21		11		43		32		41		41	
C. aegagropila (L.) Rabenh.																					11		11															
Verrucaria praetermissa (Trevis.) Anzi																															11							
other aquatic *Verrucaria* spp.	32		21		41		41		11		11		11		11		21		21		21		21								11							
Chiloscyphus polyanthos (L.) Corda				11		11		11												11		11		11													
Concephalum conicum (L.) Underw.				11		11							11					11		11		11										11					
Marchantia polymorpha L.		11		11		11		21		11		11		11			11	21	11	21		11		11				11				11					
Pellia epiphylla (L.) Corda																																						
P. endiviifolia Dicks.				11								11		11																								
Solenostoma triste (Nees) K.Müll.																																						
Lunularia cruciata (L.) Dum.		11		11		21		11		11		11		11				32		32		31		11		11		11		11								
Lophocolea bidentata (L.) Dum.																																						
Acrocladium cuspidatum (Hedw.) Lindb.																																						
Barbula cylindrica (Tayl.) Schimp.									11		11									11																		
B. recurvirostra Hedw.																																11						
Brachythecium plumosum (Hedw.) B.,S.&G.																																						
B. rivulare B.,S.&G.																																						
B. rutabulum (Hedw.) B.,S.&G.		11		11		11		11		11		11		11	11			21		21		21		21		11		11		11				11				
Bryum alpinum With.													11		11																							
B. alpinum var. *viride* Husn.																																						
B. bicolor Dicks.						11		21		11		11						21		11		11		11		11		11										
B. pallens sw.																																						
B. pseudotriquetrum (Hedw.) Schwaegr.																																						
B. capillare Hedw.													11																									
Ceratodon purpureus (Hedw.) Brid.									11											11																		
Cinclidotus fontinaloides (Hedw.) P.Beauv.																																						
Cratoneuron commutatum (Hedw.) Roth var. *commutatum*																																						
C. filicinum (Hedw.) Spruce																																						
Dichodontium pellucidum (Hedw.) Schimp.																																						
D. pellucidum With.																																						
Dicranella varia (Hedw.) Schimp.																																						
Eurhynchium riparioides (Hedw.) Rich.	21	11	11		11	11	21	11	21		42		11		11		32	21	32	11	21	11	21	11					11										
E. praelongum (Hedw.) Hook.																																11						
Fissidens adianthoides Hedw.																																						
F. crassipes Wils. ex B.,S.&G.	11	11	11		11		11	11	11	11	21	11	21	11	11		42	21	32	21	42	11	31	11	11	11			11		11		11	11					
Fontinalis antipyretica Hedw.	42		21		31		41				52		11				21	11	42	11	31	11	31	11	31		31		21		11		11		21		21		
F. antipyretica var. *gracilis* (Lindb.) Schimp.																	11		11																			
Grimmia alpicola var. *rivularis* (Brid.) Broth.								11				11		11				11		11		11		11														
Gymnostomum aeruginosum Sm.																																						
Hygroamblystegium fluviatile (Hedw.) Loeske	11	11					11	11	11	11	11	11	11	11			11	11		11			11	11		11	11	11	11									
Hygrohypnum luridum (Hedw.) Jenn.																																						
H. ochraceum (Turn. ex Wils.) Loeske																																						

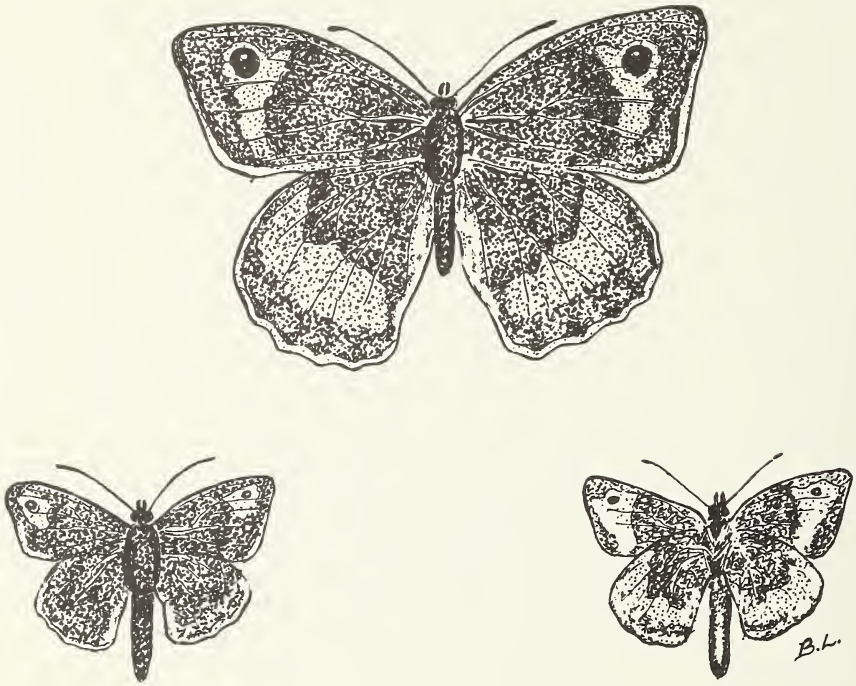
	PAGE BANK				SHINCLIFFE								BELMONT		VIADUCT				CHESTER-LE-STREET						FATFIELD							
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M. punctatum Hedw.																																								
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Tortula latifolia Hartm.			11		11		11																																	
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Funaria hygrometrica Hedw.									11		11		11																											
Equisetum fluviatile L.	11	11			11	11	11	11											11	11	11	11	11	11					11	11								
Carex hirta L. var. *sublaevis* Hornem.																																								
Carex nigra (L.) Reichard																																								
Eleocharis palustris (L.) Roem. and Schult.	11	11	11	11	11	11	11	11														11					11	11	11	11								
Elodea canadensis Michx.	11		31		41		31		11		11		31		43		11		11		11		21		11		21						11					
Glyceria declinata Breb.																																								
Glyceria fluitans (L.) R.Br.	11	11	11		11	11																											11	11						
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P. natans L.	11		33												21						11		11		31		31		11		11								
P. pectinatus L.																																	54		53		52		41		
P. perfoliatus L.																	11								52		52		42		52		11		11					
Scirpus lacustris L.													11																											
Sparganium erectum L.	42	11	53	11	31	11	32	32	52	21	31	11	11		11		21		11		21		21		42	21	21	11	11	11	11		11	11	11	11	11	11	11	11
Zannichellia palustris L.											11																													
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Caltha palustris L.																																	11							
Filipendula ulmaria (L.) Maxim.																																								
Mentha aquatica L.	11	11	11	11	11	11	11	11				11								11		11											11							
Mimulus guttatus DC.				11		11		11										11		11		11		11									11		21					
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Myriophyllum spicatum L.	32		52		41		31		11		11		41		32		11		11		11		11																
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Ranunculus fluitans Lam.	52		21		31		31		21		21		21		11														11										
R. penicillatus var. *calcareus* Butcher C.D.K. Cook											11						42		53		42		42		21		21		53		42		11		11				
Rorippa nasturtium-aquaticum (L.) Bayek			11	11	11		11																																
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Veronica beccabunga L.	11	11	11	11	11	11	11	11												11			11	11											11					
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Petasites hybridus (L.) Gaertn., Mey. & Scherb.	11	21	11	11	11	11	11	111	11	42	11	42	11	42	11	53	11	11	11	21	11	21		11		11		21	11	32	11	31		11		11				
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FIELD NOTE

An aberrant specimen of the Meadow Brown butterfly

On 23rd June 1973 Colin Wall took an aberrant specimen of the Meadow Brown *Maniola jurtina* (Linnaeus) which he found crawling over grass, together with a large number of normal specimens, all apparently recently emerged, in a meadow at Thorne Ashfields (SE/677127) near Doncaster. This he passed to me for preservation. The body of the specimen which is a female, is normal sized, as are the legs, although the antennae are somewhat smaller than normal. However the wings are considerably dwarfed; an average female Meadow Brown has a forewing measurement of 25 mm., whereas this specimen measures only 11 mm. The markings and colours are as normal, though the former are proportionately small. The specimen is figured below, in comparison with the uppersides of a normal female, taken at Tudworth, close to Thorne, and both specimens are drawn to scale.



Upper-sides of normal female (above) and both upper- and under-sides of the abberrant female Meadow Brown (below).

This miniaturisation may have been due to a pathological condition, or perhaps to poisoning, but either of these would presumably have affected the Ashfields population more extensively than is suggested by the apparent uniqueness of the specimen where it was found. A more plausible explanation lies in the possibility that the abberation was caused by an accident which the specimen experienced in one of its sub-imago stages.

Martin Limbert

ENTOMOLOGICAL REPORTS FOR 1975-76

Hemiptera (R. CROSSLEY)

Interest in Hemiptera continues and a gratifying number of records have been received from several collectors. Mr. K. G. Payne found *Enoplops scapha* (Fab.) at Port Mulgrave, Whitby in June 1975 on the occasion of the Y.N.U. visit, thus adding a further locality on the north-east coast for this striking and scarce insect. The work of the Invertebrate Survey Team at Thorne Moors during the two years under review has produced some exciting discoveries which are mentioned briefly below and which will be dealt with at length in due course. Mr. J. H. Flint comments that in August and September, 1976, there were markedly fewer Typhlocybinae than usual on trees in many parts of Yorkshire, possibly an effect of the prolonged drought.

Records have been received from Mr. J. H. Flint, Dr. L. Lloyd-Evans, Messrs. B. S. Nau, A. Norris, K. G. Payne, and P. Skidmore, to whom I express my thanks. In the lists which follow new county records are indicated thus † and new vice-county records thus*.

Heteroptera (R. CROSSLEY)

**Kleidocerys resedae* (Pz.) (63) Thorne Moors, 22/5/76; R.C. & A.N. Colonies on rhododendron. On 24/9/76 abundant on birches in same locality; R.C. Hitherto known in Yorkshire from Houghton Wood near Market Weighton, and on rhododendron at East Wood, Otley.

**Lamproplax picea* (Flor) (63) Thorne Moors, 24/9/76; R.C. Several ex. *Sphagnum* in old canal. A scarce insect recorded from Scarborough in the 1890's. Since 1971 it has been found at Hotham Carrs and Allerthorpe Common, both in V.C. 61.

**Coranus subapterus* (DeGeer) (64) The origin of a specimen found on clothing after a visit to Knaresborough Ringing Station, -8/76, is a mystery. This is the 'heath assasin bug' and it is known in the County only from the sandy heaths of east Yorkshire and Strensall Common. (per J. R. Mather, det. J.H.F.).

†*Anthocoris butleri* Le Quesne (63) Banks Hall, Cawthorne, -/3/75; L. L-E. This species occurs on Box and as it was only separated from *A. nemoralis* (Fab.) in 1957 there are few records for it, these being in the south of England. It's occurence in Yorkshire is not totally unexpected but other collectors have failed to find it in the past.

**Sthenarus roseri* (H.-S.) (64) Tadcaster, 14/7/76; J.H.F. Otherwise known from Fishlake near Doncaster, the present record constitutes the most northerly station for the species in eastern England.

**Hallodopus rufescens* (Burm.) (62) Hawnby, 3/9/75; J.H.F. On heather moor.

**Heterocordylus genistae* Scop. (63) Frickley Park, 28/6/75; P.S. This occurs on Petty Whin and was numerous on the disused railway track on the occasion of the Y.N.U. field meeting at Hooton Pagnall. The only previous Yorkshire record is for Ingleton in 1927.

**Stenodema trispinosum* Reut. (63) Blacktoft Sands, Goole, 16/7/75; R.C. Goole Moors (near old paraffin works), 1/5/76; R.C. A grassland bug associated with brackish river banks. It has previously been reported from the north bank of the Humber but it is not otherwise known north of Norfolk and Cambridgeshire.

Teloleuca pellucens (Fab.) (63) Thorne Moors, 1976; R.C. Widely distributed in small numbers; this is regarded as an upland species and its occurrence at Thorne was quite unexpected.

**Saldula pilosella* (Thoms.) (63) Thorne Moors, 22/5/76; R.C. & A.N. Common in a field drain between Moorends colliery tip and the Moors. Principally a coastal species hitherto known in Yorkshire only from Spurn.

†*Micracanthia marginalis* (Fall.) (63) Thorne Moors, 10/7/76; R.C. & A.N. A small colony discovered in a very restricted area. This is a rare British insect known hitherto from a few scattered heaths in southern England.

†*Chartoscirta elegantula* (Fall.) (63) Thorne Moors, 23/8/75; A.N. Originally found at the edge of Swinefleet Warping Drain but subsequently discovered by Mr. Norris and other collectors to be widespread in suitable localities over the Moors. A very local British insect known from less than twenty places.

The following species are recorded for the first time in the vice counties indicated but either their occurrence does not call for special comment or they are to be the subject of separate papers.

N.B. References to *Amblytylus nasutus* (Kirsch.) in the Hemiptera Report for 1974 (*Nat.*, 1976, p. 30), should be deleted, the identification having been made in error.

V.C. 61: *Plagiognathus albipennis* Fall.; *Saldula palustris* (Doug.).

V.C. 63: *Megalonotus chiragra* (Fab.); *Taphropeltus contractus* (H.-S.); *Anthocoris minki* Doh.; *Campyloneura virgula* (H.-S.); *Orthotylus flavosparsus* (Sahl.); *Calocoris roseomaculatus* (De Geer); *Saldula pallipes* (Fab.); *Chartoscirta cocksi* (Curt.).

V.C. 64: *Gastrodes grossipes* (De Geer); *Megaloceraea recticornis* (Geoff.); *Saldula pallipes* (Fab.).

V.C. 65: *Acalypta parvula* (Fall.); *Chartoscirta cocksi* (Curt.); *Sigara dorsalis* (Leach); *S. scotti* (Fieb.).

Homoptera (J. H. FLINT)

Six species are new to Yorkshire and 21 are new vice-county records. Only those believed to be of local distribution and uncommon are listed.

†*Idiocerus decimusquartus* Schr. (63) Cusworth Park, at light, -8/75; P.S. Not previously recorded north of Oxford and Herts.

**Macropsis fuscula* Zett. (61) Skipwith Common, sparingly on brambles, 13/10/74, 4/9/75; J.H.F.

†*M. scotti* Edw. (61) Skipwith Common, sparingly with the above, 4/9/75; J.H.F.

†*Aphrodes histrionicus* F. (61) Fordon Bank Nature Reserve, 13/8/75; J.H.F.

**Mocuellus metrius* Flor (63) Mickletown Ings, 27/7/76; P.S.

**Psammotettix putoni* Then (61) Spurn, abundant on salt marsh, 16/7/75; J.H.F.

**Allygus modestus* Scott (63) Campsmount, 13/7/76; P.S. *(62) Ashberry Nature Reserve, 22/8/76; J.H.F.

**Idiodonus cruentatus* Pz. (63) Thorne Moors, 25/7/76; P.S. Usually on heaths and known in Yorkshire from Skipwith, Allerthorpe, Strensall and Beck Hole.

†*Macrosteles laevis* Rib. (61) Wheldrake Ings Nature Reserve, 19/8/76; J.H.F. Usually in dry, grassy places but here found on damp meadow subject to annual flooding.

†*Emelyanoviana contraria* Rib. (64) South House Pavement Nature Reserve, near Ribblehead, in numbers on rock-rose (*Helianthemum* sp.) at 1,150 ft. on the limestone pavement, 11/7/76. Search on rock-rose at lower altitudes elsewhere in Yorkshire has so far been fruitless; J.H.F. Otherwise known from Braemar, from high altitudes in the French Pyrenees and from Austria.

†*Aguriahana stellulata* Burm. (63) Cusworth Park, several at light, 4/8/75; P.S. Although strikingly distinctive it has not previously been taken further north than Bucks. and Herts.

**Edwardsiana hippocastani* Edw. (62) Ashberry Nature Reserve, 24/8/75; J.H.F.

**Kelisia guttula* Germ. (62) Ashberry Nature Reserve, 10/10/76; J.H.F.

**Chloriona glaucescens* Fieb. (62) Fen Bog, Goathland, numerous on *Phragmites*, 6/7/75; J.H.F.

Craspedolepta flavipennis Forst. (61) Wheldrake Ings, 19/8/76; J.H.F.

**Trioza chenopodii* Reut. (63) Thorne Moors, 25/7/76; P.S.

**T. galii* Forst. (63) Bentley Common, 8/9/76; P.S.

Diptera (P. SKIDMORE)

1975 and 1976 were useful years for Diptera recording for although the number of new county additions (99) was about the same as in 1974 a vast amount of material awaits determination. 8 species included below have recently appeared in the *Entomologist's Monthly Magazine* as additions to the British List; these, in part at least, have consisted of material collected in Yorkshire.

Some additional species new to Britain collected by the writer will be published subsequently and included in a later Report; one of these, a *Dolichopus* from Denaby Ings, is currently being described by Mr. E. C. M. d'Assis Fonseca who is preparing the Royal Entomological Society Handbook to Dolichopodidae. Similarly, new British species of other families await publication elsewhere. Some of the families currently under scrutiny by the writer are in a state of flux at present owing to modern revisional works being carried out on the Continent. The Lonchaeidae for instance were revised in Britain by J. E. Collin in 1953 but his revision has been wholly superseded by the superb monograph on Palaearctic Lonchaeidae by Morge, published in 1963. The writer has determined his Lonchaeids with this work and found at least two species in the Doncaster area which had not previously been recorded in Britain. Before publishing these records much closer study of this family in Britain is required.

Most of the records published below are again from the Doncaster area but hopefully this bias will be less evident in coming years as the writer has requested light trap "rubbish" from Lepidopterists in other parts of the county. An example of the value of this material was a pill box of such "rubbish" given to the writer by Mr. P. Kendall from his light trap at Pollington; this offering included five flies new to Yorkshire and a host of other interesting species. During 1976 similar consignments were received from Mr. Kendall and from Mr. A. Grieve, R.S.P.B. warden of Blacktoft NR. This type of material is of great value in helping towards an understanding of Dipterous activity at night. Surprisingly for instance it is evident that Syrphidae are at times extremely active at night.

Apart from material from light traps, working unusual microhabitats results in some surprising discoveries. In the 1974 report allusion was made to a tiny sap run in an American Chestnut *(Aesculus octandra)* at Cantley Park, discovered by Mr. J. W. Hartley. A visit again in 1975 to this tree and removal of a teaspoonful of debris from the wound resulted in three more flies new to the county. It is noteworthy that all of the flies reared from this site have been new county additions, in most instances indeed new records for northern England.

In line with current editorial policy only new county records are published below. The new vice-county records numbering about 100 and including some from nature reserves such as Spurn, Blacktoft Sands etc. have been omitted from the present list.

Nomenclature in this list follows the *Revised Checklist of British Diptera* very recently published by the Royal Entomological Society. Unless otherwise stated, the species listed below were all collected by the writer and voucher specimens as usual have been incorporated into the Doncaster Museum collections.

The writer also acknowledges his gratitude to the Doncaster Metropolitan Authority for the light trapping facilities at Cusworth Park during 1975, and to Mr. and Mrs. Darley for granting him permission to visit their splendid estate at Cantley. Also to Messrs. R. Brooke, W. Bunting, J. T. Burn, R. Crossley, W. Ely, J. H. Flint, A. Grieve, C. A. Howes, A. M. R. Heron, P. Kendall, T. Riley and P. Q. Winter for specimens and records. Finally the writer offers special thanks to Mr. John Ismay of the Hope Dept., Oxford for kindly determining Chloropidae and to Mr. E. C. M. d'A. Fonseca for his help with Dolichopodidae.

Molophilus medius de Meijere (63) Shirley Pool, 22/6/75.

Dasyhelea holosericea (Mg) (63) Cusworth Park (light) 6/8/75. Agreeing with this species as described by Edwards (1926) but requiring comparison with closely related species recently described from eastern Europe.

D. lithotelmatica Strenzke (64) Malham Tarn (Disney, R. 1975 Ent. mon. Mag. p. 145).

D. versicolor (Winnertz) (63) Cantley Park, reared from debris from rot hole in *Aesculus octandra*; em. 9/6/75.

Bezzia multiannulata (Strobl) (63) Cusworth Park (light), 15/7/75.

Cricotopus (Isocladius) tricinctus (Mg.) (63) At light, Sandall Beat Wood, 6/7/74; Cusworth Park, 13/7, 15/7, 3/8/75.

Chironomus striatus Strenzke "Yorkshire" (Cranston, P. J. 1974. Ent. mon. Mag. p. 91).

Glyptotendipes pallens f. glaucus (Mg) (63) Cusworth Park (light) 5 and 7/8/75.

G. grypekoveni (Kieffer) (63) Mickletown Ings, 26/7/76 (at light) in Phragmites area (R.B.).

Parachironomus arcuatus (Geet.) (63) Cusworth Park (light) 13/7, 21/7, 3/8, 7/8/75.

Limnochironomus lobiger Kieffer (63) Cusworth Park (light) 28/5, 6/8, 7/8/75.

Einfeldia longipes (Staeger) (63) Don banks, Bentley Common, 2/9, 8/9/76, evidently breeding in R. Don.

Cladotanytarsus nigrovittatus (Geet.) "Yorkshire" (Cranston, loc. cit.)

Diadocidia spinulosa Tollet (64) Sawley (FJ). (Hutson, A. M. and L. N. Kidd 1974 Ent. mon. Mag. p. 31).

Mycetophila britannica Lastovka & Kidd (63) Greenfield (LNK) Lastovka, P. & L. N. Kidd, 1974 Ent. mon. Mag. p. 206).

M. ichneumonea Say (63) Greenfield and Haw Park (LNK); (64) Whitewell (AB) Lastovka & Kidd, loc. cit.).

M. sepulta (Laffoon) (64) Sawley (F. Jenkinson) Leeds area (WDH) Ravensgill (WDH) (Lastovka & Kidd, loc. cit.).

Holoplagia albitarsis (Zett.) (63) Cusworth Park (light) 13/7, 21/7, 29/7/75.

Anaretella defecta (Winnertz) (63) At light, Doncaster Museum, 30/7, 21/8/74; Cusworth Park 29/7, 6/8/75.

Lestremia cinerea Macquart (63) Cusworth Park (light) 3/8, 6/8/75.

Campylomyza flavipes Mg. (63) Cusworth Park (light) 29/7, 6/8/75.

Pachygaster atra (Pz.) (63) Cusworth Park (light) 21/7, 29/7/75. This distinctive species is usually associated with decaying elms where it breeds in the borings of bark beetles. The incidence of decaying elms has greatly increased recently as a result of the spread of Dutch Elm disease, a large number of the trees having succumbed during the past two years in the grounds of Cusworth Park itself. It is hence probable that this fly has also become numerous recently as a result of this.

Drapetis (s.str.) assimilis (Fallen) (63) Pollington Camp (light) 18/10/75 (P.K.).

Platypalpus stigma (Collin) (63) Pollington Camp (light), 18/10/75, 6/76 (P.K.). Collin (1961) gives only one previous British record for this species, from East Anglia. The striking superficial characters which caused the writer to single this specimen out from the sample presented by Mr. Kendall were the same which Collin, in his original description of the species, regarded as specifically diagnostic.

P. leucocephala von Roser (63) Cusworth Park (light) 29/7/75.

P. albicornis (Zett.) (63) Cusworth Park (light) 8/7/75.

Bicellaria intermedia Lundbeck (63) Micklebring 25/6/75.

Oropezella sphenoptera (Lw) (63) Micklebring 25/6/75.

Empis bicuspidata Collin (63) Shirley Pool 22/6/75.

Hilara griseifrons Collin (63) Cusworth Park (light) 15/7/75.

Dolichopus latelimbatus Macq. (63) Cusworth Park (light) 2/7/75 (teste E.A.F.).

D. linearis Mg. (63) Cusworth Park (light) 3/8, 6/8/75 (teste E.A.F.). Mr. Fonseca informs me that this is a decidedly rare species in Britain.

Hercostomus assimilis (Staeger) (63) Thorne Moor 27/7/75 (teste E.A.F.).

Medetera jacula Fallen (63) Cusworth Park (light) 15/7, 29/7/75, (teste E.A.F.).

M. truncorum Mg. (63) Cusworth Park (light) 3/8/75, (teste E.A.F.).

Systenus leucurus Loew (63) Cantley Park, one male reared from debris from the *Aesculus octandra* rot hole mentioned above (and in the 1974 Diptera Report) em. 8/6/75 (teste E.A.F.).

S. pallipes (von Roser) (63) Two females emerged from the rot hole debris mentioned under

the previous species, em. 6/6/75 (teste E.A.F.). Fonseca (pers. comm.) states that the members of this genus are regarded as great rarities, being very seldom seen in the adult state. The only means of locating these flies generally is by rearing them, when, as was the case here, more than one species may be found breeding together. The writer had assumed that the male which emerged from the collected material was the same species as the females, but on examination found that there were in fact two quite different species.

Rhaphium patulum (Raddatz) One male on muddy bank by R. Don, Fishlake, 3/7/76.

Diaphorus nigricans Mg. (63) Thorne Moor, 27/7/75 (teste Fonseca).

Chrysotus cuprous Macq. (63) Micklebring 25/6/75 (teste Fonseca).

C. microcerus Kewarz. (63) Cusworth Park (light) 11/6, 10/7/75 (teste Fonseca).

Campsicnemus magius (Lw) (63) One male taken on edge of Thorne Moor near foot of colliery tip. 5/76 (RC) Mr. Crossley is to be congratulated on the discovery of this very rare and conspicuous fly, probably one of the most exciting finds made on this highly interesting site. The secondary sexual adornments of the male front tarsi are perhaps the most bizarre to be seen in any of the British Diptera. *C. magius* is known only from one or two salt marshes of S.E. England.

Teuchophorus calcaratus (Macq) (63) Two males swept from dense herbage in overgrown green lane near old windmill near Haywood (6/7/76 (P.S.); One male, Pollington Camp, 7/76 (at light) (P.K.) A very rare and little known species.

Megaselia lutea (Mg) (63) Thorne Moor, 6/7/69.

Chalarus fimbriatus Coe (63) Stainton, 17/6/75.

Eudorylas obscurus Coe (63) Cusworth Park (light) 4/8/75.

E. subterminalis Collin (63) Frickley Park 28/6/75.

Syrphus latilunulatus Collin (63) Mickletown Ings 3 males, 5 females 25/7/76, swept from Barwick in Elmet (V.C. 64) but the captor Mr. R. Harris was doubtful about the identification of the specimen. According to Coe (1954) the female of this species is unknown.

Sphegina kimakowiczi Strobl. (63) Frickley Park 28/6/75 one male from trunk of sickly beech near the hall.

Physiphora demandata (F) (63) Doncaster, one in garden of writer taken from flowers of over which it was scuttling in very hot sunshine on 3/8/75; and another one on dog dung 7/76 (PS); Bilham Quarry /76 (C.A.H.). Generally regarded as a decidedly scarce insect. This extremely conspicuous species appears to favour the hottest of days. All of the above were taken on cloudless days when the temperature exceeded 30°C. In view of this it was surprising to take a further specimen on a manure heap near Clayworth (N. Notts) on a cold damp day in late October 1975.

Psila bicolor Mg. (63) Pollington camp, one male at light 7/76. (P.K.).

Sapromyza hyalinata (Mg) (63) Wentworth Park 28/5/74.

Eccoptomera pallescens (Mg) (63) Cusworth Park (light trap) 17/7/75. Whitgift (A.G.). Members of this genus are very seldom seen owing to their very secluded habitats. The most well known species *E. microps* (Mg) is probably familiar to all Coleopterists who have dug up mole nests for it breeds exclusively in the nests and burrows of this animal and is very rarely seen above ground. Other members of the genus are thought to be associated with sub-terranean mouse runs. Typical of many cavernicolous flies the compound eyes are much reduced in this genus and the arista is unusually long, indicative of a greater reliance on olfactory rather than optical senses. *E. pallescens* is the most striking member of this genus owing to its blue grey and orange coloration.

Aphaniosoma propinquans Collin (63) Cusworth Park (light trap) 6/8/75. A very little known though conspicuous fly.

A. socium Collin (63) Mickletown Ings, swept from *Phragmites*, 27/7/76.

Sepsis violacea Mg. (63) Skellbrook Park 20/5/75.

Pherbellia argyra Verb. (63) Bentley Common, swept from *Glyceria* around fishpond, 23/6/76.

P. grisescens (Mg. (63) Thorne Moor, edge near colliery, 25/7/76.

Psacadina punctata (F) (63) Shirley Pool, 22/6/75. Apparently the most northerly British record for this conspicuous snail killing fly.

Sphaerocera pallidiventris (Mg) (63) Bentley Common 25/8/76.
Leptocera (s. str.) bifrons (Stenh.) (63) Skellbrook Park 20/5/75.
L. grenstedi Richards (63) Blacktoft Sands 5/76 (A.G.).
L. brachystoma (Stenh.) (63) Whitgift, one at light 5/76 (A.G.).
L. pilosa (Duda.) (63) One swept from pasture by R. Don, Bentley Common 12/8/76.
L. (Coproica) hirtula (Rondani) (63) Cusworth Park (light trap) 30/6/75.
Eurygnathomyia bicolor (Zett) (64) Coverdale, 1922 CAC (Cogan, B. 1974 Ent. mon. Mag. p.).
Dasyops latiterebrus Czerny (63) Micklebring 28/6/75.
Lonchaea peregrina Becker (63) Cusworth Park. ex larvae under sappy elm bark with *Phaonia goberti* larvae; em. 30/4 and 9/7/75.
L. postica Collin (63) Cusworth Park. 7/8/75 (P.S.); Old Denaby 8/65 (C.J.D.).
L. fugax Becker (63) Don Gorge, em. 22/4/75 from puparium found under loose ash bark.
Anthomyza albimana (Mg) (63) Thorne Moor, 3 examples swept in 7 canals area 25/7/76. An uncommon southern species.
A. pallida (Zett) (63) Pollington Camp (light trap) 18/10/75. (P.K.).
Asteia amoena Mg. (63) Pollington Camp (light trap) 18/10/75 (P.K.). The writer has only seen one other specimen of this very conspicuous little fly from N. England and this is amongst the Trechmenn material from Co. Durham (at Sunderland Museum).
A. concinna Mg. (63) One swept in overgrown green lane near the old windmill, Haywood, 6/7/76.
Leiomyza laevigata (Mg) One swept in 7 canals area, Thorne Moor, 25/7/76.
Drosophila hydei Sturt. (63) Pollington Camp (light trap) 18/10/75 (P.K.).
Phyllomyza securicornis Fallen (63) Cusworth Park (light trap) 15/7/75.
Melanagromyza dettmeri Hering (63) Hatfield Lings 25/6/74 (J.T.B.).
M. tripolii Speicer (63) Blacktoft Sands, 29/7/75, abundant amongst Sea Aster. This appears to be the most northerly known site for this fairly recently described species; the larva mines in Sea Aster.
Oscinomorpha minutissima (Strobl) (63) Several swept from pasture by R. Don on Bentley Common, 23/6/76, 7/7/76 (det. J.I.).
Aphanotrigonum inerme Collin (63) 6 swept from Sandall Beat Fen, 18/8/76 (CAH) (det. J.I.).
Conioscinella frontella (Fallen) (63) One female swept from Sandall Beat Fen, 18/8/76 (CAH).
Tricimba cincta (Mg) (63) Two swept in 7 canals area, Thorne Moor 25/7/76.
Lasiosina approximatonervis (Zett) (63) Mickletown Ings, one swept from *Phragmites*, 27/7/76 (det. J.I.).
Diplotoxa messoria (Fallen) (63) Four specimens as follows-two males, bilham sandpit, 28/7/76 (CAH), one male Bentley Common, fishponds 23/6/75, one female, Mickletown Ings, swept from *Phragmites* 27/7/76 (PS) (det. J.I.).
Chlorops calceata Mg. (63) One male swept from 7 canals area Thorne Moor, 25/7/76 (det. J.I.).
C. troglodytes (Zett) (63) One male swept from *Glyceria maxima*, Bentley Common fish-ponds, 23/6/76 (det. J.I.).
Cinochira atra Zett. (63). Pollington Camp (light) 18/10/75 (P.K.).
Scathophaga decipiens Holiday (61) Spurn. 1975, numerous in canal area.
Chirosia parvicornis (Zett) (63) Wentworth Park 25/5/74.
Delia lamelliseta Stein (63) Sprotborough Flash 2/6/68.
D. brunneistigma Schnabl. (63) Cusworth Park (light) many from 11/6–4/8/75.
Fannia coracula Collin (63) Cusworth Park (light trap) 20/7/75.
F. similis (Stein) (63) Mickelbring 25/6/75; Cusworth Park (light trap) 2/7/75.
Haematobia (-Lyperosia) irritans (L) (63) Previously unknown in Yorkshire, this well known species, the Horn fly, has had an exceptional season in S. Yorkshire where the writer found larvae and puparia in quantity at Norton Common and Bentley Common from 16/6–31/10/76. Adults were taken on several occasions at Bentley Common by sweeping

pastures and single specimens were taken by Mr. A. Grieve in his light trap at Whitgift in July 1976 and Blacktoft in August 76. The Horn fly gains its common name for its habit of gathering on the horns of cattle whose blood it sucks. It is said that it only leaves the cattle for the purpose of oviposition in very fresh cowdung.

Hydrotaea parva Meade (63) Bentley Common, one male swept from pasture 28/7/76.

Hebecnema vespertina (Fallen) (63) Blacktoft Sands NR., at light, one male (A.G.).

Mydaea discimana Malloch (63) Inkle Moor 27/7/75.

Lispocephala falculata (63) one male Cusworth Park (light) 3/8/75.

FIELD NOTES

Notes on some insects from Blacktoft Sands

Blacktoft Sands is an extensive area of salt marsh, brackish meadow and reed beds at the confluence of the rivers Ouse and Trent, some six miles east of Goole, forming the extreme north-east corner of vice-county 63. In 1973 some 460 acres became a Reserve of the R.S.P.B., the most important bird species being the Bearded Tit of which a large breeding population had become established (A. Grieve *in litt.*). Blacktoft Sands first came to the notice of entomologists when the very local fenland ground beetle *Dromius longiceps* Dej. was discovered in *Phragmites* litter by Mr. Peter Skidmore in 1972 (Y.N.U. Annual Report for 1972, p. 18). This species had previously been recorded only from counties in eastern England (Cambridge to Lincoln), so its occurrence at Blacktoft Sands is of more than just local importance.

Subsequently a number of entomologists have visited the area and I have collected there myself on several occasions during the past three years with a view to preparing species lists of the true bugs (Hemiptera/Heteroptera), and beetles, for the general Reserve records, together with distribution notes and suggestions for conservation.

So far the only rare insect to be found is *D. longiceps* and this appears to be associated exclusively with the *Phragmites* beds. However, the salt marshes which border the rivers, and the brackish grassland, provide habitats for a number of insects which are normally found in coastal or estuarine localities, and it is the occurrence of these habitats so far inland which is perhaps the most important aspect of the Reserve in a regional context. Similar areas are to be found skirting the Humber banks from Brough to Hessle and these contain many of the same species which are established at Blacktoft Sands, but there is no guarantee that these various riverside habitats outside the Reserve will survive. If they do disappear as the result of various developments it is quite probable that the specialised insects will go with them.

The salt marsh list of insects is not large, but it includes such typical coastal and estuarine ground beetles as *Bembidion iricolor* Bed., *B. varium*Ol., *B. minimum* Fab., *B. maritimum* Steph., and *Dicheirotrichus gustavi* Crotch. Colonies of the tiny burrowing beetle *Heterocerus maritimus* G. -M. are numerous in the clay river banks, whilst the nabid bug *Dolichonabis lineatus* (Dahl.) occurs on grasses. Other bugs of note are the predatory ground bug *Salda littoralis* (L.) and the grass bug *Stenodema trispinosum* Reut. The mirid bug *Orthotylus flavosparsus* (Sahl.) is abundant on chenopods in late summer.

Full species lists, together with notes and comments have been passed to the R.S.P.B. Warden, Mr. Andrew Grieve, to whom my thanks are due for permission to visit the Reserve and for much help and advice when there. I am obliged to Mr. Colin Johnson for identifying specimens of *Heterocerus* for me.

Roy Crossley

Notes on some insects of a Yorkshire colliery tip

At first sight colliery waste tips must rank amongst the least likely of places to look for insects. This, however, is not always the case as was demonstrated rather dramatically during the summer of 1976. On 31st July Mr Adrian Norris and myself were walking across the top of the colliery tip at Moorends in order to make our way out to Thorne Moors. As we skirted the eastern rim of the tip overlooking the Moors our attention was drawn to some solitary bees which were flying close to, and walking on, the surface. A closer inspection revealed that these bees were present in huge numbers in what was a very extensive colony stretching for many yards along the bare face of the tip. Specimens we collected were kindly identified for us by Mr J. H. Flint as *Colletes succincta* (L.), a heathland species of wide distribution. The discovery of this large nesting colony of bees prompted us to look for other insects and so we searched amongst the vegetation which is colonising the tip, especially on the lower slopes. Here, to our surprise, we found a varied fauna of which the most unexpected members were three species of ground bugs (Lygaeidae). These were *Peritrechus geniculatus* (Hahn) which was first recorded for Yorkshire at Hatfield Lings near Doncaster, in 1973. Since then it has been found at Blaxton Common and at Inkle Moor, adjacent to Thorne Moors.

A further search on 24th September 1976 showed that the species was then present in large numbers. The second ground bug of note was *Megalonotus chiragra* (Fab.) which was by no means scarce. The only previous Yorkshire record is for Flixton over fifty years ago. The third species, of which only four or five specimens were found, was *Taphropeltus contractus* (H. -S.) which has previously been recorded from Spurn and Ravenscar, the latter being some forty years ago.

Females of the curious looking Mirid bug, *Mecomma dispar* (Boh.) were also found on this occasion. This species is rarely encountered, there being only four other Yorkshire records: Spurn, Robin Hood's Bay, Wharncliffe and Askham Bog.

Subsequent visits to the tip revealed other species, the most interesting being the ground bug *Nysius ericae* (Schill.), of which a large population was discovered on the gently undulating upper surface. Here the insects were running about freely in hot sunshine but in dull weather they could be found hiding beneath mats of vegetation formed by scattered colonising plants, especially Scentless Mayweed. A single example of the Lygaeid, *Scolopostethus affinis* (Schill.) was found on my final visit on 24th September 1976. As far as Yorkshire records go this is the least scarce of the species noted, but present day collectors rarely come across it in the county.

In all, eleven species of Hemiptera/Heteroptera were found and nine species of ground beetles (Carabidae). It may be the case that the prolonged hot, dry summer of 1976 was particularly propitious for these insects and following the good summer of 1975 they may have been more abundant than in other years. Even so their presence indicates a breeding population of colonising insects which is of considerable interest and it is suggested that searches of other similar habitats elsewhere in the county may reveal equally unexpected treasures!

Roy Crossley

BOOK REVIEWS

A Guide to the Birds of the Coast by **C. A. Gibson-Hill.** Pp 288. Constable. 1976. £3.50.

The original edition was published by Witherby in 1949. It has been revised and up-dated by the late Carl Gibson-Hill's brother-in-law and nephew (Bruce and Robert Campbell) and Robin Prytherch. The last has provided distribution maps and additional sketches. The 25 original plates are retained. Notes are provided on identification points, habits, habitats, status, food, nesting etc., and the term "coastal" is widely interpreted to include not only sea-birds and waders, but also such species as Red-legged Partridge and Moorhen, Stock Dove, Magpie and Wheatear.

R.F.D.

A Guide to Bird-Watching in Denmark by **Jeremy Sanders** and **Karin Berg.** Pp 63, with numerous maps and line drawings. Fack, Stockholm. 1976. Paperback. Obtainable from: J. Tidy, 9 Freewaters Close, Ickleford, Hitchin, Herts., £1.80 including postage.

This guide is a most detailed survey of the bird-watching sites in North-west Jutland and North-east Zealand. Full details of access, accommodation and birds to be seen at each site are supported by excellent and very detailed maps. With this guide the visitor can cover all the major sites in Denmark with the minimum of trouble. So good are guides nowadays that no initiative is needed to find birds and the sites they inhabit.

The modern bird-watcher is becoming spoon fed to a degree which must rob the pursuit or some of the thrill which many have had in finding things out on their own. The Danish ornithologists will await with apprehension the influx of foreign bird-watchers to many of their favourite haunts, and one wonders what the effect will be on sensitive areas.

Having said this, one can only recommend any visitor to Denmark to go armed with this volume.

J.D.P.

Birds of the Channel Islands by **Reg Jones.** Pp 31. Jarrold Colour Publications, Norwich. 1976. 40p.

The author was born and educated in Leeds.

Essentially a picture book for the younger reader, it is classed as an "area guide". Colour rendering is generally very good though falling short in Linnet and Great Tit. Thirty species, ranging from Fulmar and Gannet to Dartford Wabler and Stonechat are depicted in colour photographs. Five take up three whole pages, a further five four-fifths of three others. In the remaining 25 pages none of the remaining twenty birds and two views occupies less than a third of the page and in addition five other species are illustrated by sketches. One will readily deduce therefore that the information provided is but scanty. It is, nevertheless, a useful introduction to the area and its birds and one which will be greatly appreciated by young bird-watchers.

R.F.D.

Provisional Atlas of the Crustacea of the British Isles. Part I. Isopoda: Oniscoidea (Woodlice) edited by **P. T. Harding.** Available from: P. T. Harding, 60 Boxworth Road, Elsworth, Cambridge CB3 8JQ. £2.27.

Two things distinguish this set of distribution maps from others so far published — the strict control on species' identification and the quality of the introduction. The latter begins with a short history of woodlouse recording in the British Isles, outlines the development of the habitat recording card, and discusses the status of species closely associated with man. Maps are given for 31 species, comprising 12,500 separate records from 1,675 ten km squares. Ninety per cent of these records have been collected by no more than a dozen dedicated recorders, who are amateurs in occupation only — their work is thoroughly professional.

Paul Harding's six pages of commentary on the maps themselves combines information with authority and have much to tell the interested observer about the habitat requirements of our terrestrial isopods. Elegantly produced in red covers, with relatively few errors, and fine quality printing (except for Map 1) this probably represents the most advanced version to date of the Atlas art form.

S.L.S.

Introduction to the History of Mycology by **G. C. Ainsworth.** Pp. ix + 359, with coloured frontispiece, 104 figures and photographs, and 7 tables. Cambridge University Press. 1976. £11.00.

The recent popular interest in historical aspects of British natural history is to some extent the result of D. E. Allen's *The Naturalist in Britain* (see *Naturalist*, **101**, 34). More specialized works relating to particular historical and/or bibliographical aspects of natural history

and biology in Britain or on a world-wide scale are in preparation, and Dr Ainsworth's book is no doubt the forerunner of these. His book is scholarly and carefully traces the development of mycology within ten subject areas, such as 'classification', 'form and structure' and 'uses of fungi'. The work also contains a lively introduction, detailed notes on the text, and extensive chronology and bibliography, a most useful index of persons referred to in the text (together with dates of birth and death where known), and a subject index.

As well as providing a wealth of information, this book is excellently produced, being copiously illustrated with title-pages, parts of texts, and illustrations of other notable publications, as well as portraits of numerous eminent mycologists. Yorkshire naturalists will be particularly interested in the many outstanding mycologists connected with the county, and in the role of the Yorkshire Naturalists' Union in the establishment of the British Mycological Society. This is an impressive compilation of factual information, attractively presented; it is thoroughly recommended to mycologists, botanical historians, and both specialist and general libraries.

M.R.D.S.

Henry Walter Bates F.R.S. 1825–1892 Explorer, Scientist and Darwinian by **H. P. Moon.** Pp. 95 + coloured frontispiece and 4pp. black and white illustrations. Leicestershire Museums, Art Galleries and Records Services. 1976. Paperback. Obtainable from: Publications Office, Leicestershire Museums, 96 New Walk, Leicester LE1 6TD, price £1.25 (post and packing included).

This is a scholarly account of the life and work of Bates, of whom little is known outside his famous book *The Naturalist on the River Amazons*, and it is unfortunate that the latter work has suffered from abridgement, poor editing, etc. since the second edition (1864) onwards. Professor Moon's biography is lively in presentation, and contains a considerable amount of original material, which includes details of Bates's contributions to scientific and geographical knowledge. The book also contains extensive reference material which makes this good value for money.

M.R.D.S.

A Bibliography of the Rivers North Tyne, Wear, Tees and Swale compiled by **J. E. M. Horne,** Pp. 54. Freshwater Biological Association, Ambleside. 1977.

A detailed bibliography subdivided by region into the area as a whole and the four river catchment areas, and by topic into survey, botany, zoology, hydrology, geology and water supply. A useful author index is also supplied.

Rabies: The Facts by **C. Kaplan.** Pp 116, with black and white photographs. Oxford University Press. 1977. £1.95.

A useful compilation of seven chapters, by different authors, on a topical problem. Chapters cover The world problem; Rabies virus; Rabies in man; Rabies in animals; The behavioural ecology of the red fox; Wildlife rabies; Prospects for Britain; Rabies vaccines and Immunity to rabies.

In the editor's words, "The picture which emerges is of a serious, but not overwhelming, problem which is being attacked from many sides . . . protection against (rabies) can now be widely offered . . . but it is still worth making considerable efforts to prevent its entry to those countries and regions lucky enough not to harbour it".

B.S.

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BRENT GEESE AND *ZOSTERA* AT SPURN

BRIAN S. PASHBY

During the winter of 1975–76 Dark-bellied Brent Geese *(Branta bernicla bernicla)* were present at Spurn from 24th November 1975 to 7th April 1976. Two races of the Brent Goose winter in Britain and Ireland: *B. b. hrota* the Light-bellied race whose breeding area ranges from Franz Josef Land to Canada; a few hundred of the Spitzbergen population of this race winter off the Northumberland coast at Lindisfarne and it is quite possible that the occasional records at Spurn of *B. b. hrota* refer to birds from this locality. *B. b. bernicla*, the Dark-bellied race which breeds in North Siberia, winters chiefly on the coasts of north-west France and south-east England, the Humber Estuary being the northern limit of its main wintering area in east England. It is the birds of this race which are usually seen at Spurn. During the winter the Brent occupies a rather restricted habitat on coastal and estuarine mudflats where its food, particularly in the mid-winter months, is chiefly *Zostera* (eel grass), a flowering plant of the inter-tidal zone, although the algae *Enteromorpha* and *Ulva* sometimes form part of its diet.

The association of Brent Geese and *Zostera* has been well known for many years but special interest was aroused in the early 1930s when the plant suffered a drastic decline on the coasts of North America and parts of Europe. Though the cause of this is not fully understood it is thought that some kind of wasting disease reduced the plant's resistance to a mycetozoan parasite *Labyrinthula* sp. The effect on an already declining population of Brent Geese was catastrophic, its numbers being reduced by something like 75% of the estimated total at the end of the last century (Atkinson-Willes & Matthews, 1960). During the next twenty years the Brent just about held its own, then, up to the late 1960s, a gradual but small increase in population took place. This was followed by an almost unique series of five good breeding seasons between 1969 and 1975 during which time it more than trebled its numbers and showed a degree of adaptability hitherto unsuspected, when many birds began feeding in coastal arable fields (Ogilvie & St. Joseph, 1976). However, *Zostera* remains its chief winter food and the re-emergence of the plant at Spurn and the occurrence there of a small wintering party of Brent Geese provide a good opportunity for reviewing the history of both species at Spurn.

The Brent Goose has been described by various writers on Yorkshire ornithology as follows: "Occurs in severe winters and long continued frosts in immense flocks off the Yorkshire and Lincolnshire coasts" (Cordeaux 1872); "Common off the coast in most seasons, especially so in severe ones" (Clarke 1881); "Not uncommon off the coast in winter and in some seasons very numerous in the Estuary of the Humber" (Cordeaux 1899); "Formerly very common in the Humber Estuary. In some seasons it is fairly abundant in severe weather around Christmas time" (Nelson 1907); "Records since 1906 are not many" (Chislett 1952). Cordeaux and Nelson obviously realised that a considerable decline had taken place during the nineteenth century. Unfortunately they, like some writers of that time who used such phrases as "countless thousands", "dense clouds of birds" or even "serried ranks", used superlatives rather than figures when recording flocks of Brent Geese. An exception to this custom was Cordeaux's (1891) description of an extremely heavy invasion of wildfowl in the Humber Estuary during the severe winter of 1890–91. On 25th January 1891, with the aid of a telescope, he estimated not less than 1,500 Dark-bellied Brents within range of his glass while outside this flock was a smaller party of the Light-bellied race. Between 1,500 and 2,000 then, was regarded at that time as something which only occurred in severe weather and, one assumes, far fewer were seen in a more normal season. That this was so was

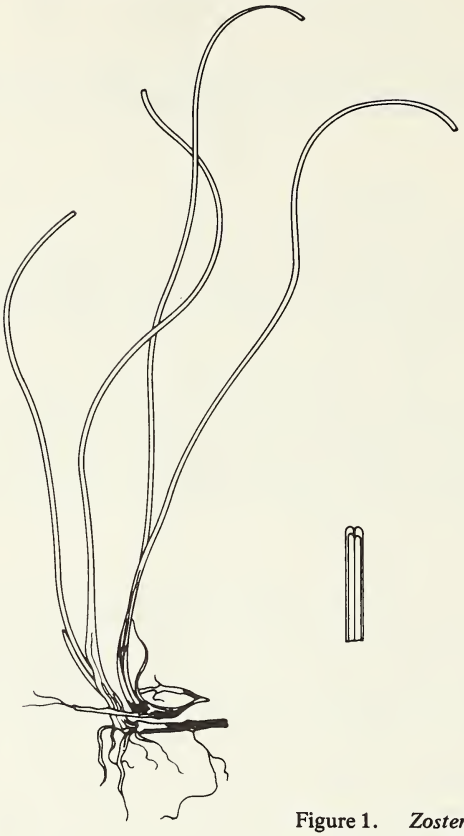


Figure 1. *Zostera noltii* × 1.
Leaf tip of *Z. noltii* × 6.

confirmed by Stanley Duncan, a well-known Humber wildfowler, who in 1911 wrote that the Brent appeared in the mouth of the Humber every year but never in large flocks except in severe winters and that the most he had ever seen there numbered about 300. A few years later there was evidence that there had been a further decline, G. H. Caton-Haig (1917) stating that from 1912 the few Brents which visited the Humber were chiefly of the Light-bellied race, the largest number of these being c. 100, and that by this time its visits were no longer regarded as regular.

Caton-Haig kept records of the Brent's numbers in the Tetney Haven area of North Lincolnshire for at least another thirty years and these showed that with the exception of the hard winter of 1929 when c. 200 occurred, numbers seldom rose above 20. The position at Spurn was no doubt the same but due to a complete lack of records we can only guess: as the total population of Brents was at an all time low during the 1940s and early 1950s it is safe to assume that, severe weather excepted, there would be very few occurrences in any winter following the collapse of *Zostera*. Between the founding of the Spurn Bird Observatory in 1946, with the consequent increase in observers there for most of the year, and 1975 the Brent was fairly regularly recorded as a passage migrant, but in three winters it was present for four weeks or more. These were in the severe winters of 1962–63 when up to three birds were seen between 13th January and 19th March; 1946–47 when between twenty and thirty

were recorded on some dates between 29th December and 2nd March and in 1961 when up to ten birds were present from 29th January to 26th February. Three Light-bellied birds were among these ten and they remained for the whole of February.

The family part of five which arrived at Spurn on 24th November 1975 settled immediately, feeding on *Z. noltii*. They were joined by other birds during December and January 1976 until, on 8th February there were 41; and on 29th February reached a peak of 53. Numbers dropped during March, there being 25 on 7th; the last ones seen were 12 on 7th April. The excellence of the 1975 breeding season is illustrated by the proportion of first winter birds in the flock. This varied from 42% to 48%, the proportion in the main wintering areas of Europe being 46%.

In the autumn of 1976, Brents were present in varying numbers from 25th September, many of them staying only a very short time. By mid-October two birds had obviously settled in and during November 10 were present. By the end of December there were 19 and the proportion of first winter birds was very low, only two being noted. Occasionally, at high tide, birds were seen feeding on the almost submerged plants of *Spartina*.

If the recent history of the Brent Goose at Spurn is somewhat obscure, that of *Zostera* is almost a mystery and is a classic case of a plant being assumed to be present (or absent) with little evidence to confirm either assumption. There are three recognised species of *Zostera* found in the British Isles: *Z. marina* L. the largest form with leaves up to 1 cm. wide and 120 cm. long with 3-7 veins in each leaf, usually occurring at or below low tide level; *Z. angustifolia* (Hornem.) Reichb. (= *Z. hornemanniana* Tutin) a smaller plant with leaves up to 4 mm. wide and 30 cm. long with fewer veins in each leaf, usually found higher up the shore from low to mid-tide level; *Z. noltii* Hormen. (= *Z. nana* Roth.) the smallest of the three with leaves only 1–2 mm. wide and up to 20 cm. long and having only one vein in each leaf, usually found on the high levels of the shore (Figure 1).

It is surprising that a plant with such a restricted habitat in the county should have aroused so little interest for almost ninety years. Cordeaux (1897) was familiar with it and described the Brent Goose feeding on it, but Robinson (1902) merely recorded *Z. marina* as having been cast up within the Spurn Head area in 1888. The next reference to the plant is by Petch (1903) who recorded *Zostera* pools between Skeffling and Spurn as a habitat of littoral animals. The Skeffling-Welwick area is also alluded to by Duncan and Thorne (1911) when they refer to "Zos" (the old wildfowlers' term for *Zostera*) growing near Patrington Haven. Almost thirty years elapsed before Petch's record was again confirmed by Philip (1936) who surveyed the "sea grass" vegetation of the Spurn area in August 1932 and who prepared a map (Figure 2) showing two distinct *Zostera* zones (an inner and an outer). At this time *Z. angustifolia* was classed as a variant of *Z. marina* as was *Z. marina* var. *stenophylla* Aschers & Graeb. However, the latter was eventually considered to be too variable to be classed as such and was dropped. Philip stated that he found no *Z. marina*, but collected specimens of the two variants and that he found no *Z. noltii*. The fact that he found no *Z. marina* is not so surprising as, in addition to the sudden disappearance of the plant at that time, it had been declining slowly for many years in quite a few areas; for example, correspondence to John Cordeaux (1890) told of its ccnsiderable decline on the Essex coast during the nineteenth century. What is surprising is that he found no *Z. noltii*, especially in the area he described as the inner zone, as that is just where it might have been expected to occur. (It is worth pointing out here, that the disease which decimated *Z. marina* did not affect the other two species and that *Z. noltii* was spreading in some estuaries.)

Just as almost thirty years went by between the records of Petch and Philip, so another forty elapsed before the next published records. In 1976 two reports appeared: J. Cudworth, in his introduction to the 1975 Spurn Bird Observatory Report, recorded the finding of *Z. noltii* that year by D. S. Ranwell and a few weeks later, Eva Crackles, in her 1974 Y.N.U. Botanical Report for the East Riding, recorded its discovery in 1974 by K. Fenton. This was said to be a plant new to Yorkshire.

Taking the various species of *Zostera*, we find that *Z. marina* was present in 1888. From that date there appears to be no subsequent record. We do not know how abundant or

widespread it was, nor do we know anything of its decline or disappearance in the Humber Estuary. It may well have been present from 1888 until the widespread decline occurred. *Z. angustifolia* probably did persist, and there is some slight evidence for this as Eva Crackles recalls seeing "long" strands of *Zostera* washed up in the bay at Spurn, near the Warren Cottage area in the 1940s. Since then there has been no sign of the plant until this paper was being prepared, when the writer found two small patches close together about 55 metres from the shore of the "narrow neck" area of Spurn.

This leaves us with *Z. noltii* and here there are indications that the plant may not be as new to Spurn as the 1974 record would imply. In 1972 a local naturalist R. Oliver, described plants he had seen on the Spurn mudflats to D. J. Boatman. These were growing about 90 metres from the shore in the "narrow neck" area and according to Dr. Boatman the description fitted that of *Zostera*. Much earlier than this, K. Fenton suspected that *Z. noltii* grew at Spurn when he found plants closely resembling it in the late 1940s, and a very significant reference is that of G. H. Ainsworth who, in a letter to the Wildfowl Trust in 1953, commenting on the increased scarcity of the Brent Goose at Spurn, suggested that one

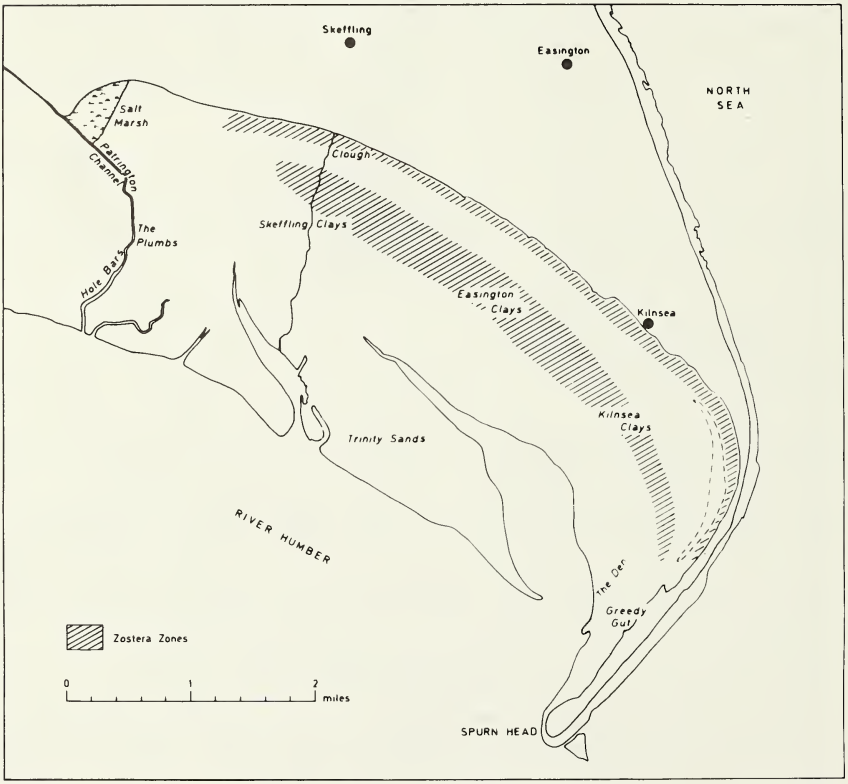


Figure 2. The two *Zostera* zones as described by Philip (1936) are, as indicated, hatched. The present *Zostera noltii* area is that inside the broken line (approximately).

of the reasons could be the "pollution of *Z. nana* in the Humber by oil and other refuse." This certainly implied that *Z. noltii* was thought to have been present prior to 1953. If this was so, for how long had it been there? Philip stated that of the material he collected, no plant appeared to belong to this form but that he found *Ruppia maritima* L. (= *R. rostellata* Koch) which he first confused with *Z. noltii*. Some of the drawings he used to illustrate his paper are certainly puzzling and one statement by him is misleading. His drawing of the transverse section of the *Ruppia* stem is the same as that of *Z. noltii* by Butcher (1934), and his leaf tip illustration of *Ruppia* is exactly like that of *Z. noltii* by Ross-Craig (1973). He also said that of those specimens of *R. maritima* collected by him, all the leaves had an indented tip. If this was so, then the plant was not *R. maritima* which, in fact, has leaves with a pointed tip as shown by Ross-Craig (1973) as have all the leaves of those herbarium specimens of this species examined by the writer. Incidentally, these have been collected from tidal pools on saltmarshes or brackish dykes near the sea wall, not from the open mudflats. It does appear that some error was made by Philip, either in his drawings or his identification; I would suggest that *Z. noltii* was indeed present in 1933 and that it gradually declined, probably due to changes in the consistency of the mud rather than to pollution, although the latter may have had some influence as the re-emergence of the plant has coincided with a decrease in pollution but this too is, I think, more likely to be the result of changes in the substratum yet again.

Ranwell found *Z. noltii* growing in a narrow belt north of the Chalk Bank; subsequently Cudworth found that it extended to the north end of the "narrow neck" where it broadened out into a patch approximately 73–90 metres × 180–275 metres. In the late summer of that year it could easily be seen as a definite green area when viewed from the road. In 1976, S. J. Weston and the writer examined the mudflats in this region and found that the plant had extended further northwards. A little lower down the shore it occurred as small isolated patches as was the case north of the main bed, the most northerly plants being found almost opposite the Warren Cottage area. It was later the same year when the two patches of *Z. angustifolia* already referred to were found. As well as the leaves being much larger, their colour was a much brighter green than *Z. noltii*. A brief search in the immediate vicinity failed to reveal further specimens but the difficulty in re-locating these plants only half an hour after leaving them emphasises the possibility that other patches could quite easily be overlooked.

The future of the Brent Goose as a wintering bird at Spurn depends on the stability of *Zostera* and a population level high enough to encourage a percentage of birds to occupy an area which is on the northern fringe of its winter range rather than remain with the main flocks. It is impossible to forecast the future of *Zostera* at Spurn. The gradual encroachment of *Spartina* will undoubtedly have an adverse effect in those areas close to the shoreline. On the other hand, the patches of *Z. noltii* north of the main bed are beyond the outermost groups of *Spartina* and may in time join to form a large bed clear of the *Spartina* zone.

That the "explosion" of the Brent population should have coincided with a sudden increase in the amount of *Zostera* available was a stroke of good fortune and revived an association not seen at Spurn for very many years. Many people, casual visitors as well as naturalists, found their winter visits to Spurn made much more enjoyable by the ease with which the geese could be seen feeding and displaying. Long may this situation remain.

SUMMARY

Dark-bellied Brent Geese wintered at Spurn in 1975–76. Their main food was *Zostera noltii* which is apparently, of very recent origin. The histories of the Brent Goose and *Zostera* at Spurn are discussed. The implication contained in a paper published in 1936, that *Z. noltii* was not present at Spurn, is questioned.

ACKNOWLEDGEMENTS

I would like to thank M. A. Ogilvie and the Wildfowl Trust for copies of their Brent Goose Abstracts for Yorkshire; D. Waite and M. Ward for preparing the illustrations; and Ken Fenton for his help and comments on *Zostera* at Spurn.

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BOOK REVIEW

A Beginner's Guide to Freshwater Algae by **Hilary Belcher** and **Erica Swale**. Pp. 48, with 110 figs. H.M. Stationery Office, London. 1976. 85.

Any naturalist from 9 to 90 who has sat fascinated over a drop of pond-water on a slide under a microscope and has wanted to identify and know more about the green, brown, yellow and turquoise organisms to be seen therein is in urgent need of this excellent little book. One species of each of 110 genera of British freshwater algae is characterised by a clear drawing, brief description and mention of usual habitats, and there are also notes on how to handle material, a short glossary and a guide to more detailed reading. Identification of any alga found in river, stream, lake, pond, ditch or puddle can be attempted by trying to match it to a drawing in the appropriate colour group, while the more experienced pond explorer can search new sites for the rarer forms. At less than ½p per page, this book should be an obligatory purchase by anyone ready to be captivated by the beauty and behaviour of microscopic plant life.

G.F.L.

THE BENTHIC MARINE FLORA OF LINCOLNSHIRE AND CAMBRIDGESHIRE: A PRELIMINARY SURVEY

PART 2

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3. Species Lists

Throughout the species entries that follow, letters related to BM(NH) collecting stations as detailed in section *2(BMNH)*; arabic figures denote collecting stations of other workers, as listed in section *2(OTHER COLLECTORS)*. Relhan and Skrimshire stations are identified by italic Roman numerals, clearly distinguishing them from the other numbered stations. For all stations, square brackets around a symbol indicate a drift record. Qualifying data are presented in notes terminal to entries, where necessary. Use of * with a species name indicates that the only record for Lincolnshire depends on material in the Bury Herbarium. Reproductive data noted for a few species are indicated. Nomenclature for all groups except the Cyanophyceae is based primarily on data presented in Parke and Dixon (1976). The Cyanophycean nomenclature is related, where possible, to the works of Drouet and Daily (1956) and Drouet (1968, 1973).

CHLOROPHYCEAE

Blidingia marginata (J.Ag).P. Dang.
J; N; O; Q; T; Foul Anchor.
14.
Distinctions between this species and *B. minima* are not always very easy to recognise; the two may be conspecific.

Blidingia minima (Näg. ex. Kütz.)Kylin
A; E; G; H; K; N; O; P; Q; R; Foul Anchor.
17b; 21a; 23a; 26; 28; 29; 31.

Chaetomorpha linum (O.F. Müll.) Kütz.
E; [L].
28; 31.
II; *V*.

Cladophara ? laetevirens (Dillw.) Kütz.
32.
This material was not unlike *C. sericea* (Huds.)Kütz., but intercalary cell-division was not detected.

Cladophora liniformis Kütz.
21a; 23a; 26.
Records determined by S. Coles

Cladophora pellucida (Huds.) Kütz.*
11; 12b.
Basal parts of the available axes infested by *Schmitziella endophloea* Born. et Batt. in Batt.

Cladophora rupestris (L.) Kütz.
V.

Cladophora ? sericea (Huds.) Kütz.
D.

Cladophora vagabunda (L.) Hoek
21c.
V.

Enteromorpha clathrata (Roth) Grev.
1; 20a.

Enteromorpha flexuosa (Wulf. ex Roth) J.Ag.
21a; 23a; 26; 28; 29; 31.
These records were determined by S. Coles who notes additionally: "common — not as abundant as [*E.*] *prolifera* — appears to be commoner in summer".

Enteromorpha intestinalis (L.) Link (Incl. *E. compressa* (L.) Grev.)
D; F; G; I; J; K; [L]; N; O; P; Q; R; T; V; Foul Anchor.
7; 12b; 16a; 17a; 17b; 18; 20a; 21a; 22; 23a; 25; 26; 29; 32.
VIc.

Enteromorpha linza (L.) J.Ag.
A; D; E.
12b; 22; 28; 31.

Enteromorpha prolifera (O.F. Müll.) J.Ag.
D; E; G; H; O; P; Q; R; Foul Anchor.
7; 17b; 20a; 21a; 23a; 26; 28; 29; 31; 33.
The material detected at Witham Outfall (stn. 0) is attributable to the growth-form often named as *Enteromorpha prolifera* f. *radiata* (J.Ag.) Bliding.

Enteromorpha ralfsii Harv.
23b.
S. Coles notes: "probably at all sites, under recorded".

Enteromorpha torta (Mert. in Jürg.) Reinb.
D; E; Q; S.
[20a]; 21a; 23a; 26; 28; 29; 31.

Enteromorpha sp.
2; 3; 4; 5; 6; 8; 9; 10; 12a; 13a; 13b; 20a; 20b.

Eugomontia sacculata Kornm.
G.
Endozoic in various shells.

Gomontia polyrhiza (Lagerh.) Born. et Flah.
G.
Endozoic in various shells.

Monostroma grevillei (Thur.) Wittr.
28.

Monostroma sp.*
12b.

Percursaria percursa (C.Ag.) Rosenv.
21a; 23a; 26; 28.

Pringsheimiella scutata (Reinke) Marchew.
I.
On *P. umbilicalis.*

Rhizoclonium riparium (Roth) Harv. (Incl. *R. implexum* (Dillw.) Kütz.)
C(iv); E; M; N; O; R; S; Foul Anchor.
16b; 17b; [20a]; 20c; 21a; 23a; 26; 28; 29; 31.
VIb.

Ulothrix flacca (Dillw.)Thur. in Le Jol.
E; S.
17b; 21a; 23a; 26; 28; 29; 30.
Epiphytic on *Fucus vesiculosus*, and amongst *Enteromorpha*.

Ulothrix pseudoflacca Wille
16b; 20c; 21a; 23a; 26.

Ulothrix subflaccida Wille
16b; 20c; 23a; 26; 28; 29.

Ulva lactuca L.
A; E; F; I; K; N; O; R; S.
1b; 12b; 13b; 17a; 17b; 20a; 21a; 23a; 26; 28; 29; 31.
II; *IIIa*; *IV*; *V*; *VIa*.

Ulvaria oxysperma (Kütz.) Bliding (= *Monostroma oxyspermum* (Kütz.) Doty).
21a; 23a; 26; 28.

Urospora penicilliformis (Roth) Aresch.
17b; 21b; 30.

XANTHOPHYCEAE

Vaucheria arcassonensis P. Dang.
16b; 21a; 23a.

Vaucheria coronata Nordst.
16b; 20c; 23a.

Vaucheria minuta Blum et Conover
16b; 20c.

Vaucheria sescuplicaria Christensen
20c.

Vaucheria subsimplex Crouan frat. (= *V. sphaerospora* Nordst.)
21a; 23a; 26; 28; 29; 31.

Vaucheria synandra Woron.
20c.

Vaucheria velutina C. Ag.
27.

Vaucheria sp.
A; E; G; N; Q; R; S.
1.

PHAEOPHYCEAE

Acinetospora crinita (Carm. ex Harv. in Hook.) Kornm.
23a; 26.

Ascophyllum nodosum (L.) Le Jol.
[N]; [Foul Anchor].
12b.
IV; *VIa* (Relhan 1820).
It is probable that material is encountered from time-to-time in the drift along most of the Lincolnshire coastline. Since the Bury material from Cleethorpes includes a whole small plant, it cannot be immediately dismissed as drift. Annotations on a Bury specimen of *Polysiphonia lanosa* also imply that the "host" plants were attached.

Dictyopteris membranacea (Stackh.) Batt.*
12b.
In the absence of material (the Bury Herbarium specimen is a painting) we repeat this record under the name used, although it seems to us impossible to accept. The very strong likelihood

is that a specimen of *F. spiralis* was confused with *Dictyopteris*. The reverse mistake has been made in the past in reports of *Fucus* from parts of the Mediterranean.

Elachista fucicola (Vell.) Aresch.
G; N; O; T; U.
18; 30.
VIa (Turner & Dillwyn 1805), (Relhan 1820).

Fucus serratus L.
VIa (Relhan 1820).
This is rather unlikely to be a true record, unless drift material was involved. The nearest authentic attached records are from Burnham Overy (Norfolk), outside The Wash (Chapman, 1937).

Fucus spiralis L.
C(i); C(iv); D; F; G; I; J; K; [L]; [M]; N; O; T.
?12b; 14; 17a; 17b; 18; 19; 30.
I.

Fucus vesiculosus L.
A; [B]; C(ii); C(iii); C(iv); D; [E]; F; G; L; [M]; N; O; P; Q; R; T; U; V; [Foul Anchor].
7; 8; 12b; 14; 15; 17b; 19; 28; 30; 32.
IV (Relhan, 1788; 1820); *VIa* (Turner & Dillwyn 1805), (Relhan 1820).

Giffordia sandriana (Zanard.) Hamel
33.

Halidrys siliquosa (L.) Lyngb.*
[12b].
Undoubtedly this record is based on drift material, although not so stated on the specimen.

Hecatonema maculans (Coll.) Sauv.
28; 31.
Epiphytic on *Chaetomorpha linum*. Probably more widespread in appropriate circumstances. See Parke and Dixon (1976) for data on the biological status of the taxon.

Laminaria digitata (Huds.) Lamour.
12c.
The paucity of records of *Laminaria* spp. is probably to be explained in terms of rarity of firm artificial substrata at appropriate levels on the shore and of the consistency of water turbidity. The only record unequivocally of attached material (see *L. saccharina*) was growing on a cockle shell on sandflats far out into The Wash at Wainfleet Ranges. Possibly the present Cleethorpes record could have derived from the *Mytilus* (Hinton-Clifton, 1963) and oyster (see Discussion and Conclusions) beds of variable longevity that seem occasionally to appear in the area. In many cases, records of large algae attached to small stones or shells are suspect in that the whole assemblage may have been simply transported from elsewhere.

Laminaria saccharina (L.) Lamour.
22.
See the note under *Laminaria digitata* (Huds.) Lamour. The Bury Herbarium additionally contains a specimen of *L. saccharina* annotated ". . . Part of a frond above 3 feet long. from the Dogger bank".

Leathesia difformis (L.) Aresch.
21c.

Myrionema strangulans Grev.
17a.

Epiphytic on *Enteromorpha compressa.*

Pelvetia canaliculata (L.) Dcne et Thur.
N; O.
It is strange that other similar artificial substrata (e.g., in Tetney Haven) in conditions of

similar environmental influence do not apparently bear *P. canaliculata*. Although discontinuity is a common facet of *Pelvetia* distribution on the east coast of England, there is usually some substrate difference to explain it.

Petalonia fascia (O. F. Müll) O. Kuntze
D; F.
24; 28; 29; 31; 33.
All the noted populations of *P. fascia* along the Lincolnshire coast have been associated with *Mytilus edulis*.

Pilayella littoralis (L.) Kjellm.
A; C(i); D; F; I; J; K.
17b; 19; 24; 26; 28; 29; 31.

Scytosiphon lomentaria (Lyngb.) Link
33.
Surprisingly little of this species was detected, in view of its usually common occurrence elsewhere.

RHODOPHYCEAE

Apoglossum ruscifolium (Turn.) J. Ag.*
12b (as *Chylocladia ruscifolia*).

Audouinella sp.
C(iv).
Epiphytic on *Polysiphonia urceolata*.

Audouinella purpurea (Lightf.) Woelkerl.
C(iv); N; O.

Bostrychia scorpioides (Huds.) Mont.
12b; 16b; 20c; 23a; 23b.
IIIa; *IIIb*; *IIIc*; *Va*; *Vb*; *VIa*; *VId*.
This species seems to be of restricted distribution in Lincolnshire, at least currently. None of our collections included material, despite careful examination of salt marsh areas (Tetney; the Lincolnshire Wash area marshes) in the north and south of the County. By contrast, other recent workers (Coles; Polderman) have reported *B. scorpioides* from between the BMNH northern and southern collecting stations. Earlier records by Skrimshire from the marshy areas around and to the west of the Nene Outfall relate to conditions and configurations that, as a result of draining and sluicing over long periods, virtually no longer exist. We examined in detail the marshy areas still present to seaward of what are presumed to have been Skrimshire's locations, without success; similarly the marshes fringing the Nene Outfall Cut apparently now lack *Bostrychia*, despite Skrimshire's earlier statements of "Wisbech" and "marshes below Wisbech". It is interesting that Coles comments that *B. scorpioides* has increased since first being seen in July 1973.

Callithamnion hookeri (Dillw.) S. F. Gray
I; J; K *Procarpic*.

Callithamnion roseum (Roth) Lyngb., [*sensu* Harvey]
N; O *Tetrasporangia; spermatangia; carposporangia*.
The occurrence in conditions of reduced salinity and presence of detritus in large quantities are quite typical for the species in England.

Callithamnion sp.
6; 8.
These plants could have been of *C. hookeri* or *C. roseum (q.v.)* in the circumstances described. Material was not available for study.

Callophyllis laciniata (Huds.) Kütz.*
11; 12b.

The material, although in good state and deeply pigmented, could still have been from the drift since plants of this species persist well after detachment.

Catenella caespitosa (With.) L. Irvine in Parke et Dixon
16b; 20c; 23b. (as *Catenella repens* (Lightf.) Batt.)
Polderman (1974b) is the only one to have detected this species in Lincolnshire. The distribution pattern is similar to that outlined under *Bostrychia*, in that there is no evidence of the presence of *C. caespitosa* in saltmarshes to the north and south of those recorded in this entry.

Ceramium diaphanum (Lightf.) Roth
C(iv); D; F; I.
All these records relate to plants from solid (artificial) substrata; in all probability, the species is more widespread in such conditions in Lincolnshire.

Ceramium rubrum (Huds.) C.Ag.
12b; 22; 34. *Tetrasporangia*; *carposporangia*.
The Bury Herbarium material is annotated: ". . . May 1849 . . . Large pieces of it growing in the saltwater pools on the oyster beds . . .". Probably more widespread than these few records imply. Despite a search for this normally common species, we were unable to detect material.

Chondrus crispus Stackh.*
12b. *Carposporangia*.
Probably attached material.

Cryptopleura ramosa (Huds.) Kylin ex Newton*
12b. *Carposporangia*.
From its state, this Bury Herbarium material was probably collected attached.

Delesseria sanguinea (Huds.) Lamour.
[L].
12b. *Carposporangia*.
All the indications are that the species can only currently be found here as drift; the Bury Herbarium specimens could well have been attached. Amongst the latter are winter collections (Jan. and Oct., 1848; Dec. 1849), including one richly carposporophytic specimen.

Dilsea carnosa (Schmidel) O. Kuntze*
12b.
". . . Deep red when found on the Oyster beds. Cleathorps [sic!] . . .". The determination is correct.

Erythrotrichia carnea (Dillw.) J.Ag.
28; 31.
This may be more widespread on the frequent *Chaetomorpha linum (q.v.)* of the salt marshes in Lincolnshire, but our collections at Buck Beck Marsh did not reveal material.

Gracilaria verrucosa (Huds.) Papenf.
N.
32.
The Boston Haven (R. Witham) collection was merely embedded in mud, not strictly attached.

Griffithsia flosculosa (Ellis) Batt.
N.
12b. *Tetrasporangia*.
The Boston Haven (R. Witham) material was merely embedded in mud, and the earlier (Nov. 1848; May 1849) Cleethorpes records could also have been drift.

Heterosiphonia plumosa (Ellis) Batt.*
12b.
The annotation on one Bury Herbarium specimen (". . . Most brilliant scarlet when fresh . . .") may imply that the plant was attached when collected.

Hypoglossum woodwardii Kütz.*
12b.
The species is well represented and correctly determined in the Bury Herbarium. Although much of the material is likely to have been drift, at least two clumps give every evidence of having been attached on collection. One of these is annotated: ". . . Picked up by EB[ury] on the oyster banks. Cleathorps. 30th Jany 1849".

Membranoptera alata (Huds.) Stackh.*
12b.
The material in the Bury Herbarium is correctly determined and was attached, with *Griffithsia flosculosa*, to a colonial hydroid; the latter could have been drifting.

Nitophyllum sp. (?)*
11.
The Bury Herbarium material is neither in good enough state nor in adequate amount for determination without reservations.

Phycodrys rubens (L.) Batt.*
12b.
It seems highly likely that the correctly determined Bury Herbarium material was of attached specimens; much ramified basal portions are present still on four of the five groups of material. One specimen is dated Dec. 1848.

Phyllophora truncata (Pall.) Zinova*
11. (as *Phyllophora brodiaei* (Turn.) Endl.).

Plocamium cartilagineum (L.) Dixon
[1]; [12c]; [34].
It is surprising that there are so few records of this species, since it persists for long periods as drift material.

Polysiphonia lanosa (L.) Tandy
12b.
VIa (Relhan 1820).
We have detected only drift material of *Ascophyllum nodosum*, the usual host for this species, and then only in the area of The Wash and the Nene Cut. The earlier Bury Herbarium specimens of *A. nodosum* could have been attached; see the note to that species.

Polysiphonia nigrescens (Huds.) Grev.
N. *Tetrasporangia.*
12b; 32.

Polysiphonia urceolata (Lightf. ex Dillw.) Grev.
C(iv); I; K.
12b.
The nature of the Bury Herbarium specimen does not permit sampling for microscopic purposes. There must remain some doubt about the attribution, although it is very likely to be correct.

Porphyra purpurea (Roth) C.Ag.
See *P. umbilicalis* (L.)J.Ag.

Porphyra umbilicalis (L.)J.Ag.
D; E; F; G; I; J; K; L; O; P.
14a; 17a; 18; 21a; 23a; 26; 28; 32.
[*II*].
Records established as *P. umbilicalis* and *P. purpurea* are all considered here on the grounds of conspecificity of the taxa. *P. umbilicalis* on artificial substrata is mostly attached; especially on the upright or steeply-angled faces, it tends to remain relatively small. Although occasional plants also appear attached epiphytically to marsh phanerogams, the vast majority of saltmarsh specimens are both free-floating (draped like stretched-skins over

the projecting phanerogam branches at low water) and of much greater size than the attached forms from artificial substrata.

Porphyra sp.
1.
This record in all probability relates to *P. umbilicalis.*

Ptilota plumosa (Huds.) C.Ag.*
12b. *Tetrasporangia.*

From the direction of residual current movements south along this eastern coastline, the very strong likelihood is that this was drift material derived from the Yorkshire coast. The determination of this Bury Herbarium material appears to be correct.

Schmitziella endophloea Born. et Batt. in Batt.*
11; 12b.

HAPTOPHYCEAE

Apistonema pyrenigerum Pasch.
21a; 26.
Coles comments that *A. pyrenigerum* is "under-recorded" for the coastlines of The Wash. From the records established by Polderman, for a number of marsh localities further north in Lincolnshire, of *Chrysomeris ramosa (q.v.)* it is likely that these and other Haptophyceae and Chrysophyceae are similarly under-recorded for all salt-marsh areas in the county.

CHRYSOPHYCEAE

Chrysomeris ramosa N. Carter
16b; 20c; 23b.
Probably more widespread than the records imply. See *Apistonema pyrenigerum.*

CYANOPHYCEAE

Arthrospira brevis (Kütz.) Drouet
See *Oscillatoria brevis* Gom.

Calothrix parietina (Näg.) Thur. ex Born. et Flah.
20b. (as *Nostoc linckia* [(Roth) Born. in Born. et Thur.] Born. et Flah.).

Entophysalis conferta (Kütz.) Dr. et D.
C.

Entophysalis deusta (Menegh.) Dr. et D.
G.
Det. R. Nielsen (as *Hyella balani* Lehmann)

Lyngbya aestuarii Liebm. ex Gom.
See *Microcoleus lyngbyaceus* (Kütz.) Crouan

Lyngbya epiphytica Hieron. ex. Kirchn. in Engler et Prantl.
See *Schizothrix calcicola* (Ag.) Gom.

Microcoleus chthonoplastes Thur. ex Gom., and *sensu* Lindstedt.
See *Schizothrix arenaria* (Berk.) Gom.

Microcoleus lyngbyaceus (Kütz.) Crouan frat. ex Gom.
16b; 20b (as *Lyngbya aestuarii* Liebm. ex Gom., restricted to upper levels of New Marsh); 20c (abundant almost anywhere on the marshes between Wainfleet and the Nene (Coles)).

Microcoleus vaginatus (Vauch.) Gom. ex Gom.
20b (as *Phormidium autumnale* Gom.).

Nodularia harveyana (Thwaites in Harv.) Thur. ex Born. et Flah.
16b; 20b; 20c; 21a; 23a; 26.

Nodularia spumigena Mert. in Jürg. ex Born. et Flah.
20b.

Nostoc commune Vauch. ex Born. et Flah.
20b.

Nostoc entophytum Born. et Flah.
20b.
". . . restricted to lower levels of New Marsh . . .".

Nostoc linckia [(Roth)Born. in Born. et Thur.] Born. et Flah.
See *Calothrix parietina* (Näg.) Thur.

Oscillatoria amphibia Ag. ex Gom.
See *Schizothrix calcicola* (Ag.)Gom.

Oscillatoria brevis Gom.
16b; 20b (as *O. brevis* Kütz. ex Gom.); 20c.
The concept behind these records is that recognised by Polderman (1974a), who included froms transitional between *O. brevis* and *O. tenuis* Gom., and between *O. brevis* and *O. laetevirens* Gom., all within *O. brevis.* Stewart & Pugh (1963) established records under *O. brevis* and *O. laetevirens*, both of which are therefore included here. According to Drouet (1968: 219) *O. brevis* Kütz. ex Gom. should be recognised under the name *Arthrospira brevis* (Kütz.) Drouet, to which all these records should therefore strictly speaking be transferred.

Oscillatoria laetevirens Gom.
See note under *Oscillatoria brevis* Gom.

Oscillatoria nigroviridis Gom.
16b; 20c.

Oscillatoria formosa Bory ex Gom.
See *Porphyrosiphon animalis* (Ag.) Drouet

Oscillatoria subuliformis Kütz. ex Gom.
See *Porphyrosiphon notarisii* (Menegh.) Kütz.

Phormidium autumnale Gom.
See *Microcoleus vaginatus* (Vauch.) Gom.

Phormidium fragile Gom.
See *Schizothrix calcicola* (Ag.) Gom.

Phormidium tenue Gom.
See *Schizothrix calcicola* (Ag.) Gom.

Porphyrosiphon animalis (Ag.) Drouet
20b (as *Oscillatoria formosa* Bory ex Gom.)

Porphyrosiphon notarisii (Menegh.) Kütz. ex Gom.
20b (as *Oscillatoria subuliformis* Kütz. ex Gom.).

Schizothrix arenaria (Berk.) Gom.
16b; 20b; 20c (all the latter as *Microcoleus chthonoplastes* Thur. ex Gom. and *sensu* Lindst.). Abundant almost anywhere on the marshes between Wainfleet and the Nene (Coles).

Schizothrix calcicola (Ag.) Gom. ex Gom.
16b; 20b (as *Lyngbya epiphytica* Hieron. ex Geitler, *Oscillatoria amphibia* Ag. ex Gom. (restricted to upper levels of New Marsh), *Phormidium fragile* Gom., *P. tenue* Gom.); 20c (abundant almost anywhere on the marshes between Wainfleet and the Nene (Coles)).

Spirulina subsalsa Oerst. ex Gom.
Abundant almost anywhere on the marshes between Wainfleet and the Nene (Coles).

4. Discussion and Conclusions

The present paper demonstrates clearly that Lincolnshire does indeed possess an impoverished benthic marine macro-flora (100 species); from the constraining nature of the mobile natural coastal substrata present, this had previously been assumed. The central eastern stretches are sandy and unstable; the north and south are predominantly estuarine and otherwise carry much saltmarsh. The marine flora of such circumstances is specialised and low in species diversity. Species outside that specialised flora are therefore highly dependent upon the existence of a wide range of artificial substrata. A very large proportion of red and brown algae (e.g., *Acinetospora*, *Audouinella purpurea*, *Callithamnion hookeri*, *C. roseum*, *Ceramium diaphanum*, *Elachista*, *Fucus* spp. *Pelvetia*, *Polysiphonia urceolata*) virtually grow only on the range of artificial structures detailed earlier, a situation in common with that of the estuarine reaches of the Thames (Tittley and Price, in press). Despite the presence of this red and brown flora, the overall totals of the locally most important five algal classes still reveal a comparative balance weighted much more in the direction of the green algae than is usual for the flora of rocky coasts. The figures that follow represent totals from which are deducted doubtful records (unsubstantiable or apparently drift) with, in parentheses, the totals of all species in the lists (excepting determinations only to generic level); Chlorophyceae 28(28); Xanthophyceae 7(7); Phaeophyceae 13(18); Rhodophyceae 18(28); Cyanophyceae 16(16). The overall total of authenticable species (82 of the 100) gives a measure of the impoverishment; even Kent, usually considered to have a poorly developed marine flora, has 211 authenticable species in an overall 272 (Price and Tittley, in prep.). The Lincolnshire pattern demonstrates a much lower than usual contribution by the brown and red algae, relative to all the other three groups but more especially to the green algae. No doubt the reason mainly lies in the termination in comparatively shallow, principally estuarine, depths of the available artificial substrata. The mooring of navigational aids and, recently, gas-drilling rigs off the Lincolnshire coast has created infralittoral stable substrata where hitherto none existed. The NE Docking Buoy has yielded *Giffordia sandriana*, otherwise unknown for Lincolnshire. More recently, *Desmarestia viridis* (O. F. Müll.) Lamour., *Giffordia secunda* (Kütz.) Batt., and luxuriant *Lomentaria orcadensis* (Harv.) Coll. ex Taylor have been collected in 10 m from a rig due east of Hull; strictly, this is outside Lincolnshire and the species are not included in our list. However, the examples indicate that the increasing number of these structures will require monitoring for future introductions, or perhaps re-introductions (see below).

It would appear to be a rather obvious conclusion that, on the basis of the material extant in the Bury collection, the total benthic marine flora (all substrata) of at least northern Lincolnshire shores was rather richer in species up to and perhaps somewhat beyond the middle years of the nineteenth century than is currently the case. This cannot be regarded as proven, although we have been unable to substantiate in the area today a large number of the specimens and reports from the past. Even during our restricted period on the Lincolnshire coast in 1974, it was possible to encounter within the confines of Boston Haven drift (or rather mud-buried) material of species (e.g. *Gracilaria verrucosa*; *Griffithsia flosculosa*) that by present standards are decidedly exotic to the marine flora of the county. Elsewhere (Chapel Point), *Delesseria sanguinea* has been readily detected in the drift. The Boston Haven drift material presumably derived from the adjacent county of Norfolk, where Chapman has reported a relatively rich flora from areas along the northern coast. However, we cannot entirely discount the possibility that there occasionally occur attached plants of "exotic" species in unusual and perhaps ephemeral circumstances within the present marine ambience in Lincolnshire. An actual case of this is the detection by Coles of one attached specimen of *Laminaria saccharina* in The Wash, although the substrate there was not so anchored that the whole could not have been wave-transported. The Bury Herbarium material is almost entirely from the area of Cleethorpes. Analogous with the possible Boston Haven/Norfolk relationship in the south, Cleethorpes is within relatively easy drifting distance of areas to the north and residual current movements are such that drift from Yorkshire would be moved south toward Lincolnshire (cf. Johnson 1970, fig. 4). These more northerly rocky shores are currently richer in species present and were probably equally so in

the past. Examination of the Cleethorpes area on very few occasions in the 1974 field-work did not, however, reveal either a reasonably abundant drift flora or, indeed, exotic elements within the drift flora that *was* present. It has to be borne in mind that we do not know how frequently, nor for what length of time, the collectors of the material in the Bury Herbarium worked along the Cleethorpes shoreline. From the available dated specimens, it appears to have been at least fairly frequently in the period 1848–1849 and sporadically thereafter. Our existing information on the current possibilities of encountering unusual drift in this area is sparse and preliminary. There is indication from the state of some of the material in the Bury Herbarium, that certain species *were* collected as unattached drift in the Cleethorpes area; this tends to suggest that Yorkshire and similar northerly shores could have been the sources of the plants involved.

The reference on the labels of some others of the Bury specimens to the material having been attached on oyster beds off Cleethorpes is interesting and may provide the major example of authenticable "natural" substrate change that has affected floristics and distribution in the local benthic marine flora. So far as we can establish, extensive beds of oyster no longer exist off Cleethorpes, presumably as a result of increase in the levels of pollution from sewage and industrial outfall in the Humber area (see, for example, Ward and Goulder, 1976), although natural fluctuations may also be involved. Oysters were certainly still present in large beds in the Humber as late as 1889 (Kew 1889). The muddy state of the Humber (see earlier) is unlikely to have undergone much change over the last few hundred years; the effect of fairly constant turbidity on oysters could be adverse, but is not likely to have varied significantly between the mid-nineteenth century and the present day. Hinton-Clifton (1963, p. 270), examining the inshore ephemeral and peripatetic *Mytilus* beds at Cleethorpes, observed that the consumption of shell-fish from the Lincolnshire coastline is rather unwise. It seems, on available evidence, that the absence of oysters today may represent the loss of what was the source of at least some attached benthic plants of algal species currently to be regarded as unusual in the Lincolnshire marine flora. It is not likely that this is the sole explanation for all the unusual specimens in the Bury Herbarium.

With the vast areas of luxiriant salt-marsh that occur, especially in south Lindsey and along almost the whole of the Holland coast, it might be expected that free-living ecads of benthic marine forms would play a very large part in the flora. They do so in the salt-marshes of Norfolk (Chapman 1937) and Essex (Baker 1912; Baker and Blandford, 1916). On the whole, we have not found this to be the case, although skeins, mostly mixed, of *Enteromorpha torta* (principally), *E. prolifera*, *Blidingia minima* and (less often) *Rhizoclonium riparium*, as well as *Porphyra umbilicalis*, are of frequent and widespread occurrence over and beneath *Halimione* and the like. Despite the presence of fairly abundant attached and strongly fruiting material of *Pelvetia canaliculata* along Boston Haven and the consistent presence of *Fucus spiralis* and *F. vesiculosus*, generally fruiting, wherever sufficiently stable substrata permitted, none of these has been found to form significant populations free-living in salt marshes. Drift fucoids (principally *F. vesiculosus*, with much *F. spiralis*) were frequent as individual plants enmeshed in *Halimione* and other marsh phanerogams; in no case did such individuals show signs of the typical aegagropilous morphological changes. *Pelvetia* was hardly detected at all as drift, and *Ascophyllum nodosum*, attached material of which was not found, was only traced as small numbers of plants cast up along Boston Haven and in the Nene Outfall Cut, throughout the Lincolnshire stretches and into Cambridgeshire. The distribution in Lincolnshire of *Pelvetia*, although curious, is in keeping with its recognised discontinuity elsewhere in south-eastern England and along other southern North Sea coasts (Price and Tittley, in prep.). Discontinuity is also a characteristic of *Bostrychia* and *Catenella* in the salt-marshes of Lincolnshire, as it is in those of Essex and Kent; however, Chapman's (1937) data for Norfolk contrast with this. The current absence of *Fucus serratus* from Lincolnshire probably relates to lack of suitable substrata in other than estuarine conditions; this is consistent with the situation in the Thames estuary (Tittley and Price, in press).

Much of the continental coastline of the southern North Sea shows some analogy to the circumstances along the Lincolnshire coast, in that superimposed artificial structures

similarly provide the main focus of attached growths of benthic marine algae in otherwise impoverished floras. The extreme example, and that to which Lincolnshire forms the closest British analogy, is the Netherlands, where the greatest proportions of the mobile substrata have been stabilised by sea-walls and many sea-arms are now in advanced states of reclamation.

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BOOK REVIEW

Marine Algae of California by **Isabella A. Abbott** and **George J. Hollenberg.** Pp. 827, with 701 figs. Stanford University Press. 1976. £11.75 ($22.50).

Concise diagnostic descriptions and representative line drawings of 669 species of multicellular benthic marine algae are set here within a taxonomic framework, including keys to orders, families, genera and species. One species of *Vaucheria*, 72 species of green algae, 137 species of brown algae and 459 species of red algae are included; blue-green algae, diatoms, phytoflagellates and GATGORE (the "green algae that grow on rocks everywhere" of Stanford University undergraduates) are not. A Master Key to Genera is provided at the end of the main text as the primary aid to identification. There is also a glossary of technical terms, a selective bibliography of references to species, and an index of botanical names.

Ten years in the making, this excellent book is "intended to be used as a manual — a combined laboratory and field reference for identifying the marine algae of California." Is it, then, of interest to anyone other than a professional phycologist lucky enough to visit the Monterey Peninsula and other famous seaweed sites of the Californian coastline? For several reasons the answer to this question is emphatically affirmative.

Firstly, the Master Key to Genera is designed to be used easily by the non-specialist, even by the non-biologist, and the careful descriptions, the superb illustrations and the wise words in the Introduction on collection and preparation of specimens all pursue this worthy aim (without in any way lessening the book's value for the specialist). So the amateur phycologist, knowledgeable naturalist or even just the bright-eyed holidaymaker off to sunny California would be well rewarded for including this volume in his luggage.

Secondly, while the geography and currents of the Californian coast combine to give it a marine flora that is highly representative of the whole Pacific (30–40 per cent of Californian species occur in Japan), the western coastline of North America from Alaska to California also boasts more unique seaweeds, especially the large and spectacular kelps, than any region other than Australasia. So, even though a rather small percentage of species is common to California and the North Atlantic, including the coasts of Britain, anyone interested in the distribution and morphology of seaweeds will find valuable comparative information in this book.

The authors pay tribute in their Preface to the many sources drawn on for the present volume, in particular the classic *Marine Algae of the Monterey Peninsula, California* by G. M. Smith. Of the 891 artistically attractive and scientifically excellent drawings, about half are new and many of the rest are taken from Smith's work. These illustrations and the general interest of the Californian seaweeds extend the value of *Marine Algae of California* beyond its primary function as a "local" field guide, while a final allurement to buy this handsomely produced and, for today, relatively inexpensive book is the inclusion of a fascinating historical review by George F. Papenfuss of North American West Coast algal studies from 1792 to the present day.

G.F.L.

NOTES ON THE FISHES OF THE YORKSHIRE RIVER DERWENT

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Since June 1975 I have lived at Stamford Bridge, North Humberside, and have collected information on the fishes of the River Derwent with particular reference to the fauna of the middle reaches of the river. These notes, which include some historical records, cover the fish species recorded in the present century. At the present time with further water abstraction and changes in the navigational state of the river likely to take place in the near future it seems timely to record these facts.

The Derwent rises on Wykeham High Moor at a height of 880 feet above sea level and, after a course of fifty seven miles, joins the Ouse at Barmby on the Marsh. The River Rye joins the Derwent near Malton and is the main feeder stream. The Pickering Beck, Costa Beck, Wath Beck and the Farndale Dove are tributaries of the Rye and the Foss Beck joins the Derwent further downstream. Tidal influence extends to Sutton on Derwent but anadromous fishes can still run upstream to well beyond Stamford Bridge.

The river is extremely important as a fishery and at least fifteen angling clubs have rights on the Derwent, Rye and tributary streams. It is also significant in faunal terms since this system forms the northern limit of distribution on the east side of Britain for a number of species.

In the summer and autumn of 1976 eighteen species of fishes were seen or caught by the writer in a stretch of approximately 500 metres between the weir and the road bridge area at Stamford Bridge. The period of time over which these notes were compiled included the driest summer on record followed by a winter in which the rainfall was the heaviest for many years. Spates on the Derwent are sudden and spectacular and the river may rise or fall by five metres in the course of a day at Stamford Bridge.

Species List

Sea Lamprey *Petromyzon marinus* **L.**
No recent records of this large lamprey are available for the middle and upper reaches of the river, though it appears to have occurred fairly regularly in the spring up to about thirty years ago. Possibly Sutton on Derwent now marks the limit of its penetration into the river.

River (Common) Lamprey *Lampetra fluviatilis* **(L.)**
Abundant in limited areas of the middle reaches. In the spring they spawn on stony areas of the river bed and in autumn there is an influx of adults from the sea. During the autumn and early winter of 1976 many took refuge in the mill pond at Stamford Bridge in the spates and a number were stranded after periods of flooding.

Allis Shad *Alosa alosa* **(L.)**
Only one record of a fish at Stamford Bridge in 1899 has been traced (Dr. E. W. Taylor pers. comm.). This anadromous species may still enter the Derwent but now seems unlikely to progress beyond Sutton on Derwent. The Twaite Shad *A. fallax* (Lac.) appears not to have been recorded for the Derwent but should be considered as of possible occurrence.

Trout *Salmo trutta* **(L.)**
The upper reaches of the Derwent are well known for this species which extends downstream to Stamford Bridge. Similarly the Rye and tributaries contain good stocks. A five pound specimen caught at Stamford Bridge in the forties is the largest known to me.

Sea Trout are recorded in the upper reaches and the Sea Cut on occasions and there are recent records for Stamford Bridge and Buttercrambe.

Rainbow Trout *Salmo gairdneri* **Richardson**
This American species has been introduced on the upper Derwent at Hackness. It has also been used to stock ponds elsewhere in the Derwent valley.

Salmon *Salmo salar* **(L.)**
C. A. Howes (1976) gives records of salmon at the Stamford Bridge weir in 1975 and reports parr in the upper Derwent. In 1976 the passage of salmon began in September and fish were seen regularly until 11th December. In early 1977 fish were hooked by anglers and one, a spawning female, was landed, and later released, in February. This fish was affected by Ulcerous Dermal Necrosis on one flank. Very little checking with anglers appears to have been carried out since the Yorkshire River Authority started to reintroduce salmon into the Ouse river system but at Stamford Bridge it would seem that recent spring and autumn occurrences have been at quite a high level.

Grayling *Thymallus thymallus* **(L.)**
This species is abundant in upper and middle courses of the river to Stamford Bridge. At the latter the favoured areas are below the weir and in the fast ripples around the road bridge. The selection of suitable habitat conditions by species such as this, and the variety of river conditions in this stretch make the fish fauna of this part of the river amazingly diverse.

Smelt *Osmerus eperlanus* **(L.)**
There are no recent records for the upper Derwent and it would appear likely that Sutton on Derwent now marks the likely limit of occurrence. In the Ouse smelts were formerly netted in large numbers up to Naburn (Dr. E. W. Taylor pers. comm.).

Pike *Esox lucius* **(L.)**
The middle and lower courses of the Derwent produce pike in large sizes and numbers. Specimens of more than twenty pounds in weight are taken fairly frequently at Elvington, Kexby and Stamford Bridge. In November 1976 fishes of 23½ lbs and 25 lbs were taken at the last mentioned and the mill pond contained a considerable number of smaller pike. A fish of 32 lbs was caught during May 1977; this is the largest recorded for the river.

Roach *Rutilus rutilus* **(L.)**
There is evidence of a decline of this species in the Stamford Bridge area in the last decade. Large individuals are however caught in the Scoreby, Skirpenbeck and Howsham reaches of the river. It appears that roach are extending their distribution upstream in the West Ayton and Forge Valley reaches (C. I. Massey, pers. comm.).

Dace *Leuciscus leuciscus* **(L.)**
A common species of the faster moving sections in the river and quite abundant over a wide area during the summer. The northern limit of the Dace in Britain extends to just north of the Scottish border.

Chub *Leuciscus cephalus* **(L.)**
An outstanding species in the middle and lower courses of the Derwent both in numbers and in size. At Stamford Bridge many in the two to five pounds range are caught. The distribution of the chub extends over the Scottish border in the south west but not much beyond North Yorkshire in the east.

Minnow *Phoxinus phoxinus* **(L.)**
Minnows are widely distributed in the Derwent and, since they are not tolerant of pollution, speak well of the river's purity. They form an important prey of pike, perch, chub and trout.

Gudgeon *Gobio gobio* **(L.)**
This species is common and widespread in the middle and lower courses of the river. In ponds in the Derwent Valley its presence may be due to introduction for purposes of providing a source of live-bait for pike fishing.

Barbel *Barbus barbus* **(L.)**
This species occurs in the middle sections of the Derwent where suitable conditions of river bed and current flow are found. North Yorkshire is the limit of its range in Britain and in parts of this area its presence may be due to past introductions and transfers.

At Stamford Bridge it is found in fast-flowing swims particularly around the weir and road bridge. The largest recorded in 1976 weighed nine pounds fourteen ounces.

Bleak *Alburnus alburnus* **(L.)**
Although this fish is common in the Rivers Ouse and Foss, even in the centre of York, it is patchily distributed in the Derwent. The most favoured areas are around Howsham, Hutton's Ambo and Yedingham but at Stamford Bridge it is scarce and irregular. North Yorkshire is the northern limit of its distribution in Britain.

Bream *Abramis brama* **(L.)**
The Howsham area and downstream to Scoreby and Kexby appear to be the best bream reaches. At Stamford Bridge it is irregular in its appearance though several were caught during spates in the autumn and winter of 1976–77.

Silver (White) Bream *Blicca bjoernka* **(L.)**
The true status of this fish is mysterious in many ways due largely to confusion with the previous species. True silver bream appear to occur upstream from Stamford Bridge towards Skirpenbeck and Howsham though no specimen has come to my notice. There is a published record of two, four pounds in weight, being caught in the Derwent in July 1933 by J. Bowater (in H. F. Wallis, ed., *Where to Fish* 1973–74). This species reaches the northern limit of its distribution in this area.

Stone Loach *Noemacheilus barbatulus* **(L.)**
A small species which occurs in suitable sections of the main rivers, usually along the margins and in backwaters. It is also found in becks and streams in the Derwent Valley.

Eel *Anguilla anguilla* **(L.)**
Common over almost the entire fish-holding length of the Derwent and its tributaries. On the lower Derwent it was formerly the subject of a considerable fishery for food purposes but this no longer exists.

Burbot *Lota lota* **(L.)**
The obvious decline and apparent disappearance of this species from the rivers of eastern England in the present century is a biological mystery. Before 1938 it was tolerably common and well known though not often caught by anglers. In the Stamford Bridge area, where it

was known as the burbot eel, they were caught by hand or in landing nets as they lurked in holes under the river banks. Around 1960 there were records from the East Cottingwith to Bubwith section of the river and F. C. Barton (pers. comm.) told me of others at Kirkham, the farthest upstream record with the exception of one from the River Rye, Elvington, Wheldrake and Sutton. The last mentioned was taken in the mid nineteen fifties.

Perch *Perca fluviatilis* **(L.)**
The middle and lower reaches of the Derwent and also the Pocklington Canal, plus other tributaries, lakes and ponds contain perch.

Ruffe *Gymnocephalus cernua* **(L.)**
This little fish is widely though patchily distributed in the Derwent, Rye and smaller becks, drains and streams. Its status may vary within a short distance and some areas are obviously preferred to others. The species reaches the northern limit of its distribution in eastern England in this area.

Miller's Thumb *Cottus gobio* **(L.)**
Another small species which lives in backwaters and small streams and becks, the miller's thumb is found in the main river mainly at times of spates. At Stamford Bridge they occurred along flooded banks among thick marginal growth during flood periods.

Three-spined stickleback *Gasterosteus aculeatus* **(L.)**
Along the Derwent these sticklebacks are found mainly in muddy backwaters, drains and becks. Around Stamford Bridge they form a minor component of the fauna and are a relatively unimportant prey for predatory fishes and birds.

Ten-spined stickleback *Pungitius pungitius* **(L.)**
In the Derwent Valley becks, ponds and tributaries such as the New Hertford River contain ten-spined sticklebacks which are often more common locally than the three-spined species. The distribution of this species in Yorkshire is generally southern and eastern and appears to follow the margins of post Ice Age lakes to a considerable extent.

Flounder *Platichthys flesus* **(l.)**
The flounder is most frequent downstream from Bubwith in the main river. It formerly occurred as far upstream as Stamford Bridge but Sutton on Derwent would now appear to be its limit.

ADDITIONAL SPECIES:
The following occur in, or have been introduced into, lakes and ponds in the area; Castle Howard Lake, and ponds at Sand Hutton, Claxton, Full Sutton and Elvington represent the main still-water fisheries in the district:
Rudd *Scardinius erythrophthalmus* **(L.)**
Tench *Tinca tinca* **(L.)**
Crucian Carp *Carassius carassius* **(L.)**
Carp *Cyprinus carpio* **(L.)**

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THE PIPISTRELLE BAT *(PIPISTRELLUS PIPISTRELLUS)* IN AND AROUND YORK

M. J. A. THOMPSON

Introduction

This preliminary survey, carried out by the Yorkshire Mammal Group, is on the distribution and composition of pipistrelle bat "nursery" colonies in and around York, and the status and distribution of the male of this species. The information for this paper is derived from three sources, namely:

1. Field work carried out by the Yorkshire Mammal Group in July, 1974, and from June to August 1976.
2. A nursery colony analysis carried out at Haxby by Mr. Robert Stebbings in July 1974. This forms part of a long term study of size-clines in the pipistrelle bat, related to climatic factors in the United Kingdom, being carried out by Mr. Stebbings.
3. My own records of pipistrelle bats from the York area since 1970.

The pipistrelle bat is the commonest species of British bat, and the most widely distributed in Britain; few studies have been done on their nursery colonies in Yorkshire. The only recent comprehensive study in Yorkshire was carried out by Mr. Colin Howes at Branton, near Doncaster, in July 1972 (*Naturalist,* 1973, pp. 25–24). Using a technique developed by Mr. Stebbings, the Yorkshire Mammal Group performed an analysis of a colony at Skelton, near York, in July 1974, followed by studies during the summer months of 1976.

During those months, and depending on the local publicity given to bats, the Group located nine nursery colonies around York, but none of these were in the City centre. The local home owners, having 'phoned in the location of their colonies were then encouraged, where possible, to do nightly counts of the emerging bats.

Of the nine colonies located, five were analysed, one at Skelton in 1974, two at Wheldrake and one each at Sand Hutton and Haxby in 1976. Other colonies were found, but they had dispersed before an analysis could be organised. These were at Nun Monkton, Haxby, Howsham and the original colony that Mr. Stebbings had analysed at Haxby in 1974.

The information collected consisted of total numbers, sex/age ratios, measurements of forearm, wing span and fifth digit lengths and occasionally of the bat weights. The parity and lactation states of the females were noted, and the general condition of the bat, such as damage to their wing membranes. Where possible, the ectoparasites were removed; all of these were sent to Dr. M. Usher of York University for identification. The mites were noted but not identified. Dr. Usher also kindly carried out the statistical analysis of the measurements taken.

The position, altitude and the age of the building containing the roosts was recorded, also the general habitat around each roost. The predominance of recently built houses being used by the pipistrelle bat for their nursery roosts would seem to indicate that they like clean and cob web free conditions.

The Nursery Colonies

Every July, usually early in the month, pregnant female pipistrelle bats come together, along with young females, to have their young. The bats probably gather from a wide area and the colonies, according to Mr. Stebbings can be up to two thousand strong, but in the study area, we have only had counts of up to four hundred individuals. In any one colony there can be found three main age groups of female bats and one of males: namely, adult females, sub-adult females and juvenile females and juvenile males. Young nulliparous females are twelve months old, and are described as those bats that have fused firm epiphyses, more 'leathery' wing membranes, brighter coloured pellages and small non-suckled nipples. Juvenile bats are up to four weeks in age, but on the wing have large non-

fused soft epiphyses, dull and dark grey/brown pellages and no visible testes in the male, or almost non-visible nipples in the female. At no stage did the Group find any adult females carrying their young, prior to them reaching the free flying stage.

By mid-August most, if not all, of these colonies would have dispersed; the adult females leaving first to seek out the males in order to mate. Each colony has during its existence several summer roosts.

Table 1. Nursery Colony Size

Site	*Total Nos.*		*Date*	*1st Date Obs.*	*Dispersal Date*
Haxby (No. 106)	max.	93	26.7.74	Not known	Not known
	min.	67	27.7.74		
Skelton	max.	59	28.7.74	Not known.	Not known
	min.	—	—		
Wheldrake (No. 24)	max.	207	24.6.76	Early June	5.8.76
	min.	12	10.7.76		
Howsham	max.	400+	14.7.76	10.7.76	15.7.76
	min.	180	—		
Sand Hutton	max.	37	10.7.76	Early July	Not known
	min.	12	16.7.76		
Haxby (No. 83)	max.	80+	Mid July	Mid July	Not known
	min.	25	7.8.76		
Haxby	max.	100+	1975	Not known	Not known
	min.	60+	1976		
Nun Monkton	max.	100+	10.7.76	6.6.76	5.7.76
	min.	—	—		
Wheldrake (No. 32)	max.	80	9.8.76		
	min.	11	14.8.76	9.8.76	14.8.76

(a) Wheldrake (Grid ref. 44/687452 & 44/685452)

Because of the interest and co-operation of the local residents, of the York colonies this was the most studied. The village, situated seven miles south-east of York, has a modern cul-de-sac development on its eastern edge. The houses were completed in 1971. Roosts were located on houses numbered 13, 20, 24 and 32, and of these, the main roost was at number 24. Both to the north and south of this housing development were open cereal fields, bounded by hedgerows with several mature trees; a quarter of a mile to the east is the River Derwent. Thus, there were ample feeding areas. All the roosts, except one, were south facing; the exception was facing east. However, on the main roost at number 24 the bats had two entrances, the majority using the south roost, but a few emerging from the north side of the house. In all cases the roost entrances were at the gable-ends of the houses, and the bats emerged from cracks between the soffit and the brickwork.

The first count that the residents of house number 24 did on their nursery roost was on 14th June, 1976, with 94 bats recorded from the front entrance and 70 from the back. The following evening the totals were 164 and 35 respectively; by 24th June numbers had peaked at 207 individual bats from the front roost only. The following night the Group caught 136 bats and there were 5 escapes. The count for 26th June, probably because of the Group's activities, was only 100 bats. However, at the same time, the house opposite (no. 13) had noted increasing numbers; the owners had first noticed that they had got a nursery colony in 1975. Meanwhile, 12 bats were counted out of the house number 20, but by 10th July only 12 bats emerged from numbers 13 and 24 and a few days later none at all.

On 9th August, there was a further report of bat activity from Wheldrake, but this time from house number 32. Here, on that evening, from a south facing gable-end 80 bats were counted out, with 50 on 11th August and 35 by the following evening. On 14th August the Group caught 10 bats from this site and there was one escape. From that date it was assumed that the whole Wheldrake colony had dispersed.

(b) Sand Hutton (Grid ref. 44/696586).

The colony at the village of Sand Hutton was small in size. This was probably related to the size of the space available for roosting, which was located behind an air vent in the side of a south facing wall. Directly opposite the roost was a tall bank of mixed deciduous trees. This house was built in 1960. The house owners counted out 36 bats on 10th July. The Group caught 12 bats at this site on 16th July; no dispersal date was recorded.

(c) Haxby (Grid ref. 44/604587 and 44/606587).

In the village of Haxby three nursery colonies have been located since 1974; one of these, on the Twothorpe Road (Grid ref. 44/617583), was observed by the late Dr. D. Aspinall. The roost was behind some vertical facing tiles on a brick wall, on the south side of a house built in the 1930's. There were numerous exit holes, so that trapping of the bats was considered to be too difficult. However, counts over 100 were obtained in 1975 and over 60 in 1976, according to the householder.

The other two roosts in houses built in 1972 were facing south-west. On 27th July, 1974, Mr. Stebbings from Monkswood analysed the colony in house number 106. He caught 66 bats with one escape; there had been a count of 93 on the previous evening. Subsequently, the owners blocked up the exit holes. The colony had moved to house number 83 in the middle of July 1976, where the owners counted 80 bats. However, by the time an analysis had been organised the bats had disappeared elsewhere. They returned with a count of 10 on 6th August; on the following evening 25 bats were caught. The bats emerged from the gable-end between the soffit and the brickwork; the roost being in the wall cavity and not in the loft. None of the Haxby colonies are near wooded areas, but are all within easy reach of the River Foss.

(d) Skelton (Grid ref. 44/572565).

This nursery colony has been present at this site for a number of years, and would appear to be increasing in size. It is three miles north-west of York and unlike most other sites, it is north-facing, and opposite a large bank of mixed mature deciduous trees. The roost, in a house built in 1939, is between the facing tiles and brickwork of a first floor bow window, and it has two main exit holes. From this colony 57 bats were caught on 28th July, 1974, none in 1975, and by the time an analysis was organised for 1976 the bats had moved on elsewhere.

(e) Howsham (Grid ref. 44/738627).

On 10th July, 1976, 180 bats were counted out from under the eaves of a house which was built in 1610, and is south-facing. These numbers had increased to over 400 by the 14th July. The roost was situated between the roof tiles and the eaves, with no apparent access to the loft. The house is a middle cottage of a row of three; bats were also emerging from the gable-end of one of the end cottages, all of which had been recently modernised. The apparent doubling up of numbers between the two dates could indicate that the young were coming out on to the wing for the first time. This habitat seemed to be the most favourable of those that were inspected since it supported such a large colony. During the evening of the large count the owners of the middle cottage had noticed that the bats emerged in batches, and that the first batches headed straight for the trees; possibly these were the young, with the adult females going further afield for their feeding grounds on the River Derwent.

The residents, unable to tolerate such a large colony, blocked up the exit holes on the 14th August, so that when the site was inspected on the following evening, no pipistrelle bats were found, other than a solitary mature male. The male was found in the loft, and obviously

had its own exit hole. A number of the bats had apparently moved over to the small gable-end roost of the end cottage.

(f) Nun Monkton (Grid ref. 44/509578).

This south-facing colony was first noticed on 1st June, 1976, and by mid-July counts of over 100 were being obtained. There was also a small roost in the neighbouring house. In the house, built in 1710, the bat roost was in the 18 month old dormer extension; there is a high bank of trees opposite, with the River Ouse only 200 yards away. The bats had dispersed by 5th August, and no analysis of this colony was carried out.

Table 2. Altitude, climatic condition and times of emergence of nursery colonies analysed

Site	*Date*	*Alt. Asl.* (ft.)	*G*	*Climate*	*Temp. in 24 hrs.* max °C	min °C	*Time of Emergence* 1st bat	last bat
Haxby	27.7.74	50		Not recorded	18.5	—	20.23	20.50
Skelton	28.7.74	50		Cold, cloudy, windy	Not recorded		20.25	21.22
Wheldrake	26.6.76	25		Hot, very warm, no wind	32.5	—	21.54	22.32
Sand Hutton	16.7.76	100		Warm, clear SW winds, light	23.6	14.4	Not recorded	
Haxby	7.8.76	50		Warm, cloudy, light winds, dry	20.6	14.4	20.17	21.00
Wheldrake	14.8.76	25		Warm, cloudy	22.4	12.6	20.35	20.45

Structure and Contents of the Nursery Colonies Analysed

It would appear that except at the Skelton in 1974 and Wheldrake colonies, the Group has had little success in trapping large numbers of bats. None of the samples are really large enough in 1976 to make the findings statistically significant, although they may indicate trends.

From the Wheldrake colony 136 adult females were recorded, making no differentiation between this group of bats and the young adult females. However, some of the females were obviously pregnant, and others, some 21 in all, were lactating. The pregnant females still had a mucus plug in their vaginal orifices; in all thirty-one were positively identified. Possibly five young adult females were identified by their lighter pelages, and almost non-visible mammory glands. On being released all the bats flew immediately, and of these, only one made its way back to the front roost.

When the Skelton colony was analysed in 1974, it was found that of the 25 adult females caught, 19 were post-lactating and the rest still lactating, even though this was a month later by dates than the Wheldrake 1976 analysis.

In 1976, the young were coming out on the wing, somewhere around 14th/16th July, because the first juveniles were caught at Sand Hutton on the 16th July, and the total numbers leaving colony at Howsham approximately doubled two nights previously. By the time the colonies had dispersed the young would be seven to eight weeks old. According to R. Stebbings, juvenile sex ratio is 1:1 and only the second Wheldrake trap showed this, although it and the sample taken at Haxby (1976) were too small to draw any definite conclusions.

It is also possible to estimate the total size of the *P. pipistrellus* colonies. By taking into account the mortality rates amongst the juveniles of these gregarious nursery colonies, plus the adult males, which are not located but associated with the colony, we estimate there were between 400–500 bats present at Wheldrake. Likewise a similar number were probably present at Howsham.

At Wheldrake at least 40 had damaged wings, varying from small holes in the wing membranes to complete tears. One bat had its wing membranes torn from its trailing edge to its forearm. The tear had healed by fibrosis so that the membrane had lost its elasticity. Nevertheless, on being released it appeared to fly quite normally.

Table 3. A summary of the Yorkshire Mammal Group's findings

Site	*Date*	*Captured no. bats*		*Adult female*	*Sub-adult female*	*Juvenile female*	*Juvenile male*
Haxby	27.7.74	66	(1)	23	1	22	20
Skelton	28.7.74	57	(2)	25	0	12	20
Wheldrake	26.6.76	136	(5)	136	(see text)	0	0
Sand Hutton	16.7.76	12	(0)	10	0	1	1
Haxby	7.8.76	25	(4)	1	0	9	15
Wheldrake	14.8.76	10	(1)	0	0	5	5

Brackets indicate escapes.

Field Measurements

Three field measurements were taken, namely the forearm (FA), the wingspan and the fifth digit lengths; weights were taken of every tenth bat that was caught. Only measurements of adult females and young adult females were used for statistical analysis and the smallest samples omitted.

With such small numbers in some of the samples, it is only possible to make comparisons between the three measurements taken and various colonies by using a 'Student t.' test (see N. T. J. Bailey 1961) (see Table 6). Pairwise comparisons have been made between each of the colonies.

It is probable that some of the differences between the means shown on Table 6, can be partially accounted for by the different techniques of measuring used by different field workers. All the field measurements taken for the Group were by one individual — Mr. Anness. He found the wingspan measurement was the least accurate, because of the intrinsic elasticity of the wing membranes.

Taking these factors into account, the Y.M.G. data shows that there is a very significant difference between the forearm wingspan and 5th digit measurements of the Wheldrake and Skelton colonies. However, because all but one of the wingspan comparisons show significant differences, whatever the colony analysed, one can probably attribute these differences to the difficulty in obtaining repeatable measurements and not morphological variation. There also appears to be a significant difference between the 5th digit measurements of the Skelton and Sand Hutton colonies. Obviously more field work is needed on the morphological differences between these various York colonies, but the data that exists are suggestive, and the mean sizes of individuals in at least two colonies are obviously different. Why this should be is not at all obvious. Are they age effects, or genetic differences, for example?

Table 4. Comparison of field measurements taken by Yorkshire Mammal Group and other authors

Site		*FA.*	*Wingspan*	*Fifth Digit*	*Weight Range*
Wheldrake 1976	n	136	136	136	
(Y.M.G.)	m	32.59	214.29	40.41	5.2–7.2 gms.
	sd	0.71	6.14	1.65	
Sand Hutton 1976	n	10	10	10	
	m	32.24	205.1	39.87	5.5–6.0 gms.
	sd	0.49	4.72	0.91	
Skelton 1974	n	25	25	25	
	m	31.99	207.32	38.34	Not taken
	sd	0.81	5.84	1.53	
Haxby 1974	n	24	24	24	
(R. Stebbings)	m	32.32	227.4	39.19	Not taken
	sd	0.59	4.70	1.37	
Branton 1972	n	12	Not taken	Not taken	
(C. Howes)	m	33.12			4.5–7.0 gms.
	sd	1.45			
Charlton Marshall	n	40	40	Not taken	39
(R. Stebbings) 1967	m	31.51	222.6		5.19
range	min.	30.0	min. 210	min.	4.24
	max.	33.1	max.235	max.	5.81

Abbreviations: n = total number in sample
m = mean in millimetres
sd = standard deviation

Table 5. Pipistrelle bat records from 100 kilometre sq. SE(44)

Location	*Grid ref.*	*Date*	*Sex*	*FA. in mm.*	*Comments*
1.Skelton	568562	3.7.70	F.		Lactating
2.Wheldrake	66–46–	Aug. '72	?		In forestry hut
3.Clifton	583538	15.7.72	M.		——
4.Dringhouses	58–49–	10.9.72	?		——
5.Rowntrees	60–53–	26.9.73	5F/2M	29–31 range	Young adults
6.Rowntrees	60–53–	7.8.74	1F/1M		——
7.Castlegate	60–51–	2.11.74	M.	32.7	Hibernating
8.Acomb	583510	March '75	F.	32.0	Hibernating
9.Haxby	60–56–	April '75	F.	32.0	——
10.Skelton	568562	2.6.75	M.	30.2	Dead
11.Hudson House	597517	12.9.75	M.	30.4	Centre of York
12.Grimston	56–51–	9.10.75	M.	32.0	Not hibernating
13.Piccadilly	607518	28.6.76	M.	30.0	Dying, tumour
14.Howsham	738627	15.7.76	M.	29.4	——
15.Skelton	568562	16.7.76	M.	30.0	Caught on wing

Table 6. Summary of statistical results

Comparisons (values of Student's t, with significance, using the means from Table 4)					
	Haxby	*Wheldrake*	*S. Hutton*	*Skelton*	*Branton*
Wheldrake	1.72	—	—	—	—
Sand Hutton	0.42	1.54	—	—	—
Skelton	1.65	3.80***	0.89	—	—
Branton	2.36*	2.24*	1.84	3.05**	—
Charlton Marshall	5.89***	9.00***	4.09***	2.93**	6.04***
Wing Span	*Haxby*	*Wheldrake*	*S. Hutton*	*Skelton*	
Wheldrake	9.94***	—	—	—	
Sand Hutton	12.60***	4.63***	—	—	
Skelton	13.24***	5.25***	1.07	—	
Charlton Marshall	3.80***	7.82***	10.00***	11.24***	
5th Digit	*Haxby*	*Wheldrake*	*S. Hutton*		
Wheldrake	3.41***	—	—		
Sand Hutton	1.43	1.02	—		
Skelton	2.04*	5.81***	2.93**		

*** = 99.9% certain that there is a significant difference between the means i.e. almost conclusive.

** = between 99.0% and 99.9% certain that there is a significant difference between the means i.e. reasonable certainty.

* = between 95% and 99.0% certain that there is a significant difference between the means i.e. suggestive, but no more or no less.

nil = no significant difference between the means.

Other Pipistrelle Bat Records

From time to time, not only do I find individual pipistrelle bats, but also receive live or dead specimens from members of the public, in and around York. The majority of these solitary records are males, some are females. These records are given on Table 5.

Of these records only two were found hibernating. All solitary bats found within the City centre were males; the nearest female records to the City centre were from Rowntree's factory. The seven pipistrelle bats found at Rowntree's on 26.8.74 were roosting behind a curtain. The adult male from the Merchant Adventrurers Hall had a small abdominal tumour.

Ectoparasites

Where possible, fleas, mites and ticks were removed; only the fleas were preserved in surgical spirit. The fleas were found anywhere on the fur, but the mites were mostly noted on the wing membranes including the intra-femoral membrane; also around the ears. The only tick removed was from a juvenile caught at Wheldrake on the 14th August, and it was found on the abdomen.

Twelve fleas were removed from the Wheldrake colony on the 26th June, all were *Ischonopsyllus octactenum*. These consisted of 10 males and 2 females. A female only of the

same species was found on a female bat at Sand Hutton on the 16th July. Both these flea records are new 10 km. square records for Yorkshire. At Haxby on the 7th August, two males and five females of *I. octactenum* were removed from the bat colony at that site, and a male and a female flea from the juvenile bats caught at Wheldrake on the 14th August.

Conclusion

Although this survey is obviously imperfect, the results are encouraging. They indicate that an amateur organisation like the Y.M.G. can both undertake fairly detailed and time-consuming studies and produce useful results and at the same time come to understand a little more about a common species of bat — *Pipistrellus pipistrellus*.

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BOOK REVIEW

Wanderers in the New Forest by **Juliette de Bairacli Levy.** Faber & Faber. 1958 (paperback 1977). £1.95.

Augustus John in his short foreword and the author in her diffuse and rambling account of living in a cottage in the New Forest for a period of not quite three years both deplore local changes that they saw taking place there some twenty years ago. A slightly more profound and scientific approach might have convinced them that the Forest, subject as it has been to changing forms of management for a thousand years, is rather more durable than they had feared. Even their concern for gipsies is a pursuit of a will-o'-the-wisp, for they would award the freedom of the Forest only to true gipsies as against all the other kinds of 'travellers' to whom they apply the term 'mumpers' and other derogatory names without indicating the bases on which they draw these distinctions. Some remarkable claims are made about the properties of herbs. The author has a powder that will prevent wood pigeons eating peas; another that deters all insect pests from crops, without discouraging or harming bees; another that drives off rats, and yet another that prevents mosquitoes and other blood-sucking insects from biting. She knows also of cases of tuberculosis and even cancer which have been cured by herbal potions. Naturally however in a book of this discursive and emotive kind no details are vouchsafed.

F.H.B.

A SURVEY OF THE FOOD HABITS OF STOATS *(MUSTELA ERMINEA)* AND WEASELS *(MUSTELA NIVALIS)* IN YORKSHIRE

C. A. HOWES
Museum and Art Gallery, Doncaster

In the succession of works on British mammals to appear up to the 1960's (e.g. 1, 11 and 20) authors have frequently commented on and moralised about the predatory role and hunting techniques of stoats and weasels, though apart from a very few personal anecdotes the prey lists and accounts of hunting behaviour are in fact largely unsubstantiated. Possible sources however may be recognised in the *Zoologist* (e.g. stoats and weasels preying on rats and mice — Mosley, O., *Zool.* 1884, 488-490; stoats preying on moles, water voles, birds and mice — Briggs, J. J., *Zool.* 1884, 714; weasels preying on rabbit — Turner, W., *Zool.* 1845, 846). Campbell (2) has made use of more recent anecdotal accounts abstracted from *The Countryman.*

At least since the early 18th century in Yorkshire weasels and stoats, referred to under such vernacular names as clubsters, clubstarts, lobsters, grass-cats, wressels, weevils, weezels and wazels, have been officially persecuted, bounty money at a rate of 2d. per weasel head being paid out of parish funds — nine shillings and ten pence in such money being paid during 1734-5 in the parish of Arksey near Doncaster (C. A. Howes, in prep.). The corpses of weasels and stoats are still a familiar sight on keepers' gibbets today, but for species traditionally regarded as vermin in Britain, very little scientific investigation has been carried out into their food habits and predatory roles. Until the mid 1960's the only authoritative studies of these and allied species had been conducted in N. America (15) in the U.S.S.R. (14), and on imported European mustelids in New Zealand (12). Only through the work of Linn (10), his student Day (5 and 6) and more recently King (9), Potts and Vickerman (16), Moors (13) and Tapper (19) have any serious and detailed studies been undertaken in Britain.

Day's study was based on the analysis of 168 samples (gut and scats) of stoats and 152 of weasels, the material being gathered from 31 areas in Britain and Ireland including one site in Yorkshire. His valuable and highly revealing results provided for the first time a prey list and percentage occurrences for each prey category discovered as well as outlining the techniques for similar and more locally orientated studies. However, in view of the difficulties of obtaining sufficient quantities of data, the following compilation, based largely on sight records of prey kills or pursuit sequences, is offered as an alternative, if crude, method of investigating prey and hunting behaviour. Unfortunately by this method records, particularly those selected for publication, tend to represent the exotic and atypical, viz the stoat stalking a heron along the foreshore at Scarborough (*Nat.* 1886, 241), weasels in urban areas eating whipped cream (R.B., 31/12/1971), taking cat food (*Nat.* 1965, 13), bread (B.R., 17/8/1969) and raiding a bird table (P.D., 6/2/1973).

From sight records, small mammalian prey is only occasionally identifiable, whereas the scat and gut analysis methods employed by Day (5) enable identification to species level. Day's method, however, is only capable of working bird material to family level, whereas with sight records bird prey is usually identifiable to species.

The following catalogue is largely compiled from the mass of unpublished information on file with the Y.N.U. mammal recorder, together with additional material abstracted from the *Naturalist (Nat.),* the *North Western Naturalist (N.W. Nat.)* and the reports of the Natural History Societies at Bradford, Castleford, Harrogate, Hull, Scarborough and Sheffield. (For key to initials of recorders, see acknowledgements).

Records of stoat prey

Hedgehog, *Erinaceous europaeus* L. Kirkburn 23/10/1975, a stoat dragged a partly squashed specimen across a road (C.A.H.).

Shrew, undetermined *Sorex* sp. Cayton Bay -/9/1974 (E.H.W.).

Rabbit, *Oryctolagus cuniculus* L. Allerthorpe Common -/6/1945 (*Nat.* 1945, 142); Barnsley, -/7/1961, attempting to catch a pet rabbit (R.S.A.); Bramhope 27/10/1969 (P.B.); Driffield -/11/1972 (E.H.W.); Dumpling Castle, Tickhill, Summer 1959 (C.R.); Farnley 26/1/1962 (I. M.); Kilham Farm, Cantley (*Nat.* 1902, 374); Low Marshes 25/4/1973 (R. M. H.); Potteric Carr, Autumn 1975 (I. H.); Spurn -/9/1963 (Y.N.U. file); Young taken (4); Thornton-le-Dale 20/12/1929 (*Nat.* 1930, 116).

Grey Squirrel, *Sciurus carolinensis* Gmelin. Esholt Sewage works 28/1/1973 (L. M.).

Mouse, undetermined *Muridae*. Hole of Horcum (*N. W. Nat.* 1930, 88); Silkstone Fall, Barnsley -/2/1958 (*Nat.* 1959, 10).

Brown Rat, *Rattus norvegicus* (Berk.). Glusburn -/1/1949 (*Nat.* 1950, 26); Hole of Horcum (*N. W. Nat.* 1930, 88); Hull (*Nat.* 1960, 12); Sheffield area (3); York (*Nat. 1941*, 16 and 1943, 21).

Water Vole, *Arvicola terrestris* (L). Ganton -/11/1975 (C.I.M.); Gowdall 15/4/1974 (C. A. H.).

Heron, *Ardea cinerea* L. Scarborough foreshore (*Nat.* 1886, 241).

Domestic Duckling, *Anas* sp. Rishworth, ten taken (*Nat.* 1962, 16).

Pheasant, *Phasianus colchicus* L. Roche Abbey 1960 (C. J. D.); Thornton-le-Dale, watched taking eggs (18/3/1974 (G. K. G.).

Domestic Poultry, *Gallus* sp. (*Nat.* 1932, 36); Cropton 21/2/1969, hen and ten week old chicks killed but not eaten (R. B.).

Coot, *Fulica atra* L. Wentworth Woodhouse lakes, watched stalking chicks 13/9/1968. (D.H.)

Lapwing, *Vanellus vanellus* (L). One being stalked at Grimwith reservoir 24/4/1961 (S. B.) and at Middleton Moor 1/5/1971 (G. W. P.).

Skylark, *Alauda arvensis* L. Spurn, -/9/1963 (*Nat.* 1964, 17); nestlings taken (4); Warrendale -/4/1972 (E. H. W.).

Sand Martin, *Riparia riparia* (L). Seamer gravel pits, watched entering nesting holes 27/7/1973 (*Y. N. U.* Ann. Rep. for 1973, 7).

Wheatear, *Oenanthe oenanthe* (L). Spurn 4/9/1963 (*Nat.* 1964, 17).

Meadow Pipit, *Anthus pratensis* (L). Spurn, nestlings taken (4).

Willow Warbler, *Phylloscopus trochilus* (L). Farnham, nestlings taken -/6/1974 (D. M. J.).

Yellow Wagtail, *Motacilla flava* (Blyth). Skelton, watched stalking young 25/6/1972 (M. J. A. T.).

Tree Sparrow, *Passer montanus* (L). Farnham, raided nests in two tit boxes -/6/1974. (D. M. J.).

Small Passerines, undetermined *Passeriformes*. Sleightholmedale -/4/1964 (*Nat.* 1965, 13).

Trout, *Salmo trutta* L. Crackpot beck, Swaledale, seized a hooked fish (*Field* 1885, 671). Driffield 1964 (J. D.); Malmerby Mere, winter 1936 (*Nat.* 1936, 142).

Records of weasel prey

Common Shrew, *Sorex araneus* L. Tees Marshes (*Nat.* 1887, 9).

Shrew, undetermined *Sorex* sp. Calverley 19/7/1973 (H. B.): Conysthorpe 21/7/1973, (M. J. A. T.); Cottingham -/10/1968 (E. H. W.); Spurn, on 'several occasions' during 1973 and 1974 (4).

Rabbit, *Oryctolagus cuniculus* (L). Airedale -/3/1973 (R. A.); Gale Common (*Ann. Rep.* Castleford Nats. Soc. 1974); Knapton 5/4/1962 (A. J. W.); Snittlegate (*Y. N. U. Ann. Rep.* for 1973, 7); Spurn taking offal from 'potter' trap -/12/1973 (A. C.).

Wood Mouse, *Apodemus sylvaticus* (L.) Cayton -/4/1975 (C. I. M.); Marley, 7/2/1971, (W. G.); Spurn (4).

Bank Vole, *Clethrionomys glareolus* Schr. Ampleforth 19/7/1941 (*Nat.* 1942, 14); Sandtoft, remains in scats 19/8/1975 (C.A.H.).

Short-tailed Vole, *Microtus agrestis* (L.) Driffield 18/10/1975 (E. H. W.); Tees Marshes "Weasels are very common, preying on the many field voles" (18).

Small rodents, undetermined *muridae*. Ackworth 1963 (N. V. M.); Allerton 8/6/1973, (M. G. P.); Falcon Inn, Staintondale, 21/6/1974 (M. H.); Great Horton 7/2/1971 (Mr. S.); Hillam 1968 (R. A.); Hole of Horcum (*N. W. Nat.* 1930, 88); Newton-in-Rawcliffe 13/6/1974 (J. E. S.); Raincliffe Woods, Scarborough 1974 (C. I. M.); Thrybergh reservoir, hunting mouse in snow, winter 1964 (C. J. D.).

Skylark, *Alauda arvensis* L. Wintersett 16/5/1964 (*Nat.* 1965, 13).

Blue Tit, *Parus caeruleus* L. Hooton Roberts 21/9/1952 (*Nat.* 1953, 25).

Song Thrush, *Turdus ericitorum* Turt. Forge valley 21/3/1973 (*Y. N. U. Ann. Rep.* for 1973, 7).

Blackbird, *T. merula* L. Giggleswick 15/2/1973 (*Y. N. U. Ann. Rep.* for 1973, 7); Horsforth (*Nat.* 1962, 16).

Yellow Wagtail, *Motacilla flava* (Blyth). Esholt 1/8/1962 (K. H.).

Starling, *Sturnus vulgaris* (L). Swinsty reservoir 21/5/1972 (G. H.).

Small passerines, undetermined *Passeriformes*. Charm Park, Hutton Buscel 19/2/1974 (W. A. C.); East Ayton 17/2/1974 (W. A. C.); Spurn 1973 (Y. N. U. file) nestlings taken at point (4); Tees Marshes, "feed on ground nesting birds". (18); Skeffling, remains in scats 10/7/1976 (C. A. H.).

Common Lizard, *Lacerta vivipara* Jacq. Spurn, 24/5/1963 and 11/8/1963 (*Nat.* 1964, 17), also summer 1964 (4).

Common Frog, *Rana temporaria* L. Thackley 1970 (N.F.); Thornton-le-Dale (*Nat.* 1950, 26).

Evidence of rodent, insectivore or bird prey taken by carnivores can be inferred from the ectoparasite fauna which temporarily takes refuge on the predator of the primary host. A freshly dead weasel found by (G. D.) at Arksey, 11/4/1965, carried three female *Ctenosthalamus nobilis vulgaris* Smit, a flea commonly found on small rodents and insectivores (17) and a female *C. bisectodentatus* Kolenati, regarded as a flea monoxenous on the mole (*Talpa europaea* L.) thus possibly indicating a recent hunting sortie along a mole run. Pursuing small rodents and moles along their subterranean runs is probably an important feature of the weasel's hunting repertoire. Day (6) notes that weasels have been caught in mole traps and (C. I. M.) forwards records of one so trapped during February and two during April 1975 at East Heslaton. On 12/4/1964 (R. J. R.) watched one run down a hole in pursuit of a small rodent at Almholme.

Although most of the above records of birds, particularly the ground nesting species, were being stalked or caught on the ground, stoats are well able to hunt arboreally to exploit the harvest of birds' eggs and nestlings during spring — from the above dated records of birds being preyed upon, over 58% were taken during the months of April, May and June. A stoat was watched climbing through a hedgerow evidently in search of nests at Sleights on 13/5/1969 (C. I. M) and (J. W.) watched one climb a tree at Scalby Mills on 22/5/1974. (C. M. W.) recorded a would-be nest robber on 22/5/1962, which being mobbed by alarmed birds, fell twenty feet from a tree in Harewood Park and at Farnham near Harrogate (D. M. J.) noted that two tit boxes occupied by tree sparrows had been raided by a stoat during June 1974. At Adel, Leeds, on 1/6/1974 (C. G. V.) watched a stoat explore every tree in a small copse, meticulously searching every branch before running head first down the trunk and onto the next tree. Again at Adel, a similar episode was watched by (C. M. and J. M.) when a stoat contrived to obtain food from a net suspended from an arm projecting from a 'cat proof' bird table. By climbing an adjacent tree, leaping onto the bird table and climbing down to the net, the stoat was able to remove several lumps of suet and drop them to the ground. It returned the same way it had come and made off with its prize. Weasels are also easily capable of climbing to raid the nests of hedgerow birds, their climbing abilities being evidenced by one which found its way into a tit nesting box at Knaresborough in 1972 (B. R.) — the possibility of weasels habitually raiding occupied nesting boxes is discussed by

Ferns (7). It is worth quoting here Tapper's study (19) designed to gauge the predation levels of stoats and weasels on game bird populations. From gut contents of specimens trapped during the months of May, June and July, the period when chicks were available, passerines formed 18.7% of the prey items taken by stoats and 22.2% taken by weasels, whereas galliformes represented a relatively small 6.8% and 2.1% respectively. Eggs (of undetermined species) were taken by both mustelids appearing in 10.4% of the samples from stoats and 4.2% from weasels.

The importance of lagomorphs in the diet of the stoat is shown by the work of Day (6), Potts and Vickerman (16) and Tapper (19) who record 31.3%, 40.9% and 56.0% respectively for the % frequency in gut and scat material. This contrasts with the 22.2%, 15.6% and 7.6% which they record for weasel. Indeed the present study records 13 rabbit catches for stoat compared with only 4 for weasel. During the mid 1950's the flea-carried virus disease myxomatosis spread through Yorkshire causing a severe depletion and local extermination of rabbit stocks. The dependence of the stoat on rabbits as a major food source became evident at this time, with reports of steep declines in stoat numbers coming from areas where rabbits had become scarce. On the Sandbeck estate, keeper E. R. Molyneaux (24.3.1965) remembered a drop in numbers of stoats trapped during the period of myxomatosis. The same phenomenon was reported in the Knaresborough area (*Nat.* 1959, 10), on Teesside (18) and at Goathland in 1966 (L. C.). In Littondale, the records of Mr. Gill, an estate keeper, show that about 60 stoats per year were trapped before 1955, the year myxomatosis reached the dale, dropping to about 10 per year during the period of rabbit depopulation. Hewson (8), using game keeper's records from an 800 ha. estate in Yorkshire, notes that about 44 stoats per year were trapped during the 1940's, dropping to 9 per year in 1969 as a result of depleted rabbit stocks.

Interestingly, the weasel population on Hewson's estate grew when stoat numbers dropped, about 17 per year being trapped during the 1940's rising to 31 in 1969 (the ratio of stoats to weasels trapped on the estate pre-myxomatosis was 2.6:1.0 changing to 0.3:1.0 in the period of low rabbit numbers). This phenomenon, Hewson suggests, could be due to the reduced stoat population taking fewer small mammals and therefore lessening competition for the weasel's staple food. Weasels were thus able to dominate their hunting niche, exploit a greater proportion of available prey and increase their population. By 1963 weasels on Spurn were thought to be "well outnumbering stoats" (Y. N. U. file), also in 1963 (W. B.) reported that weasels were now being seen more than stoats in the Knaresborough area. The same was true for the Royston, Carlton and Wintersett area, (J. S. A.) noting that only one stoat had been seen in four years, and Stead (18) referring to the Tees marshes, also noted that stoats had declined and that weasels were abundant, being seen "more frequently than any other mammal".

Clegg (3) referring to the post-myxomatosis period, noted that stoats in the Sheffield area were feeding "to a great extent on brown rats". However Hewson (8) infers that the stoat decline in his study area had sufficiently reduced predatory pressures on the brown rat to allow its numbers to rise, about 14 being trapped per year during the 1940's compared with 48 in 1969. He also commented that foxes, which may have prevented this increase from developing, were vigorously controlled in the district.

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BOOK REVIEWS

The Secret Life of Insects by **P. Passarin d'Entrèves** and **M. Zunino.** Pp. 384. Orbis, London. 1976. £8.95.

This well produced book concentrates on the life-style of selected insects, with detailed accounts of termites, bees, wasps, butterflies, moths and locusts, and shorter sections on dragonflies, mosquitoes, ants, Diptera, scarab beetles, grasshoppers and crickets. A few other topics are also touched upon, especially camouflage, mimicry and the biological control of insect pests. The book is based upon a French television series but the latter has metamorphosed into the printed page with considerable success. Stilted phraseology occasionally reveals that the text was not written originally in English, and there is sometimes a lack of integration between pictures and text. The numerous coloured photographs are for the most part very good, making the occasional bad one more noticeable. Some should have been rejected or the blocks remade, for example the termite nest on p. 34 and the fig-wasp larvae on p. 111. However, the book can be recommended as an attractive introduction to a fascinating subject.

G.F.L.

Murex Shells of the World, an Illustrated Guide to the Muricidae by **George E. Radwin** and **Anthony D'Attilio**. Pp. 284, 32 colour plates. Stanford University Press. 1976. $35.00.

The Muricidae are, after the Cowries and Cones, one of the most sought-after families of the Mollusca because of the large variation in shape and form found within this group. This makes it one of the most interesting groups as far as the average collector is concerned. The identification of these animals has proved to be one of the main drawbacks to the study of the Muricidae over the years, comprising as it does such different species as the Venus Comb (*Murex pecten* Lightfoot, 1786 = *Murex tenuispina* Lamarck 1822), a delicate shell of some 150 mm in maximum length with a large number of long curved spines, and the solid robust Oyster Drill (*Ocenebra erinaceus* (Linne, 1758)) which is so common on the shore of our south coast.

This book will almost certainly prove to be one of the most important works on the Muricidae to be published since volume two of the *Manual of Conchology* by G. W. Tryon, Jr. published in 1880. The publishers' notes state that 390 species are described giving range data and synonymy, 15 of which are described for the first time. The complicated synonymy of this family would make it almost impossible to include every synonym known, but with the aid of the 500 plus illustrations I found no difficulty in identifying most of the specimens in the collections of the Leeds City Museums. A complete revision of the species and their nomenclature has produced a number of interesting and perhaps debatable changes, one example of which is the lumping of the three species of *Muricanthus*, *M. nigritus* Philippi 1845, *M. ambiguus* Reeve 1845 and *M. radix* (Gmelin 1791), under the name *M. radix*. These three species have always been difficult to separate conclusively and many people will agree that they are synonymous with a high degree of polymorphism present, but this could, and may well, lead to controversy.

For the specialist who has access to live or freshly preserved material, this volume will prove to be of real value as it contains 179 line drawings of such parts as the radula, protoconch and intritacalx. Most collectors never take a second look at the animal within the shell, usually killing and throwing it away, or more usually just collecting empty shells from the shore-line. Therefore the use of the radula for identification is limited to specimens collected and preserved whole. In the same way the protoconch of a shell like a Murex is very often so badly worn or damaged that its value is often limited. This must be remembered when use is made of the table on pages 4 and 5 which gives the characteristics of the five sub-families. Of the 14 characteristics listed, depending on the general condition of the shell and how much is known of its history, anything between 5 and 9 characters will not be available. The main value of the book to the professional and amateur alike will be the 32 colour plates illustrating 450 specimens. These are a very fine series of photographic reproductions; my only reservations being the small size of some of the figures, for example figures 12 and 13 on plate 29 are so small that it would be difficult to place these specimens into the family Muricidae let alone to use them as an aid to naming material down to species level. However I have no doubt that this book will find a place on the bookshelves of many collectors and libraries alongside the other monographs published in recent years on the Cowries, Cones, Olives and Volutes. On the whole, an excellent book which deals with a complicated subject in a way that it is easily readable.

A.N.

The Proud Eagles by **Mary Patchett.** Pp. 215, with black and white illustrations. White Lion Publishers Ltd. 1977. £4.95.

The combination of a lame boy, whose mother is dead, and a semi-tame eagle has all the ingredients of a sentimental popular story. In fact this is an interesting, well-observed and readable account of the lives of wedgetailed eagles in the Australian bush. The carefully drawn descriptions of life and the wildlife on a sheep station holds the reader's attention. It is evident that many Australian farmers have a Victorian outlook on predators, which are shot on sight, in spite of the important ecological niche they occupy. The book should appeal to both children and adults.

J.D.P.

Birdwatching in Yorkshire by **R. F. Dickens** and **W. R. Mitchell**. Pp. 96, with 15 black and white illustrations. Dalesman Publishing Company. 1977. £1.00.

This book covers the birdwatching habitats of the historic county of Yorkshire in a most thorough fashion. The typical habitat types are surveyed, giving a general account of the species of birds which can be seen. This is followed by a list of Yorkshire haunts which it would be difficult to fault. The authors detail the species expected to occur, without over emphasising rarities, and apart from map references avoid the current fashion of pampering to the reader with detail of access, car parks and all the other needs of the modern naturalist.

A short chapter on migration gives the seasonal variation of the birds to be seen, and is followed by a sensible check list which avoids the over emphasis on extreme rarities.

The photographs of birds and habitats enhance the value of the book and make it a delightful production to possess. Lack of space prevents these two well known Yorkshire ornithologists from being anecdotal which is a pity, but the book holds one's interest throughout. It is of value to the newcomer, to the bird watcher making his first exploration of the county, and the experienced will find much of merit in it. It is good value in these days and should be a well deserved best seller.

J.D.P.

Life in our Estuaries by **Heather Angel.** Pp. 32, with 46 colour photographs. Jarrold Colour Publications, Norwich. 1977. 40p.

Each new booklet in Jarrold's Nature Series adds yet another miniature cornucopia to their list. Like any good conjuror's hat this recent issue holds a diversity of pleasures and surprises, something for everyone from Baby John to Aunt Edna. Format and price are measured to the modest pocket, so that these aptly select views of the estuarine setting and its creatures (ranging from a footprint in black mud to the areolate cracks of a dried-out salt-pan, and from the litter of spiral wrack to the massing of sludge worms) would make a rewarding present from almost anyone to almost anybody on almost any occasion. If one mentions one or two fleeting occurrences of laxity of structure in the prose-text (an unrelated participle on p. 12 particularly catches the eye) it merely serves to underline the perfectionist demands such a production encourages in the reviewer. Certainly, if Jarrold's continue in this way, more and more readers will end up echoing Alice's question before she plummeted to the rich wonderland down the rabbit-hole, "What is the use of a book without pictures?"

A.H.

The Hedgerow: Scouting Training Wall-chart with accompanying illustrated booklet (12 pp.). The Scout Association. 1977. Chart (ref. no. SP54) 80p and booklet 40p, available from: Scouting (Dept. C), Baden-Powell House, Queen's Gate, London SW7 5JS. (Postage extra.)

An attractive 15″ × 23″ wall-chart in full colour depicting 50 plants, 31 vertebrates and 54 invertebrates common in British hedgerows, and supported by an instructive booklet, designed for the scouting training programme. They will also prove most useful in a variety of teaching situations. This further development in the scouting movement's concern for the environment will be welcomed by all naturalists.

Thorburn's Naturalist's Sketchbook, with an introduction by **Robert Dougall.** Pp. 136, with 49 colour and 91 monochrome plates, and 8 engravings. Michael Joseph. 1977. £6.50.

The illustrations of British birds and mammals of Archibald Thorburn (1860–1935) combine beauty with scientific accuracy. This new edition includes most of the illustrations and text of the 1919 edition of *A Naturalist's Sketchbook* in a new format, together with additional plates and engravings from his works on *British Birds* and *British Mammals*; they span about thirty years of the artist's work. Appropriately the plates are accompanied by Thorburn's original text and no attempt has been made to up-date the information. The publishers are to be complimented on the most attractive presentation of this volume.

Mister Badger by **R. Lewis**. Pp. 107, with numerous line drawings. Research Publishing Co., London. 1976. £2.00.

One man's view, sympathetic but pessimistic, of badgers in Sussex.

Welsh Timber Trees: Native and Introduced by **H. A. Hyde**, fourth edition, revised by **S. G. Harrison**. Pp. xii + 166 with 28 plates and 52 text figures. National Museum of Wales, Cardiff. 1977. £3 + 47p postage.

It is sixteen years since the last edition of this book was published. The new edition contains few major alterations but numerous minor ones which bring the work up to date. These refer particularly to information relating to the Forestry Commission and records of noteworthy specimens in Wales. As with the companion volume on Welsh Ferns this work is effectively a guide to all native and commonly planted British trees and the keys for the identification of species in such troublesome groups as the poplars, elms and conifers, together with the numerous clear line drawings, make this a book of value to all British botanists. There is much supplementary information on natural and commercial woodlands, the ecology of different species and uses to which their timbers are put, and lists of notable Welsh specimens of each species. From the last we learn that the tallest tree in Britain is a specimen of the Fir *Abies grandis* at Leighton Hall, Welshpool, which measured 184 ft by 11 ft 4 in in 1975.

W.A.S.

Applied Biology, edited by **T. H. Coaker**. Volume 1. Pp. x + 358. Academic Press, London. 1976. £10.50.

This first volume of a new series, which will be particularly welcomed by the professional biologist and environmentalist, contains five papers devoted to (1) population dynamics of plants, (2) development of forest science, (3) birds as pests, (4) wildlife management and the dynamics of ungulate populations, and (5) population biology and the management of whales. Naturalists will also find much to interest them, especially the contribution on birds, and the extensive bibliographies which accompany each article. The volume concludes with a useful 14-page subject index.

According to the preface "Each article seeks to fulfil four aims. They review generally the state of a subject, but select one or more aspect for particular critical discussion; they summarize what is known to be of practical importance and indicate where each author sees the greatest need for future work." Each of the authors are to be complimented for fulfilling most or all of these criteria, and the publishers are to be commended for their high standard of book production.

M.R.D.S.

The Pruning of Trees, Shrubs and Conifers by **George E. Brown**. Pp. xix + 351, with 16 plates and numerous line illustrations. Faber and Faber. 1977. Paperback, £3.95.

A most useful and comprehensive work, first published in hardback in 1972, which gives detailed and practical advice on all aspects of pruning for the professional as well as the amateur. An alphabetical list of genera describing the pruning method most suited to each species is supplemented by chapters on the training of young specimens, remedial work on badly grown or damaged older trees, wildlife conservation and many other topics. Appendices include not only instructions on how to care for and repair the tools involved, but also, somewhat pessimistically, first aid methods to revive and restore their owner should an accident occur.

V.A.H.

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Edited by M. R. D. SEAWARD, M.Sc., Ph.D., F.L.S., The University, Bradford

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THE NATURALISTS' YORKSHIRE

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THE MARSH HARRIER IN YORKSHIRE

ANDREW GRIEVE

R.S.P.B. Warden, Blacktoft Sands

Historical Status

In the 18th century, the Marsh Harrier *Circus aeruginosus*, known then as the Moor Buzzard, still nested around Doncaster, especially on Hatfield Moors and Carrs, but also occasionally in the East Riding, near Bridlington and Scarborough, on Cleveland Moors, Hebden Bridge, near Sheffield and Halifax (Nelson, 1907). The great drainage operations during this period, were undoubtably the main cause of decline to the last recorded Yorkshire breeding near Lindholme in 1836 (Rhodes, 1967), its final demise being hastened by the gun and by egg collectors (Nelson, 1907).

Subsequently it became a scarce visitor to Yorkshire (Nelson, 1907), until 1941, when an increase in reports (see Table 1) was probably mainly due to an increase of bird watchers, though shooting pressures had eased during the War. However, it still remained a scarce visitor (Chislett, 1952).

Status Since 1945

From 1946, the status changed to that of a passage visitor in very small numbers, with occasional summer and winter records. Further increases from 1956 were probably attributable to increased observer activity and coverage. It would appear that there was a genuine increase between 1956 and 1962, at a time when more Marsh Harriers were breeding in Britain than at any time this century, with 15 to 20 pairs in East Anglia, Wales, and Southern England (Sharrock, 1976).

A large spring influx into Yorkshire in 1962 (see Fig. 1) was followed by the breeding in 1963 of the first pair to nest in the county since the last recorded breeding at Lindholme, 127

Table 1. The number of Marsh Harriers *Circus aeruginosus* recorded in Yorkshire in five-year periods since 1846.

Years	No.	Years	No.
1846 — 1850	1	1911 — 1915	0
1851 — 1855	0	1916 — 1920	2
1856 — 1860	1	1921 — 1925	1
1861 — 1865	0	1926 — 1930	1
1866 — 1870	1	1931 — 1935	1
1871 — 1875	3	1936 — 1940	0
1876 — 1880	2	1941 — 1945	4
1881 — 1885	1	1946 — 1950	13
1886 — 1890	1	1951 — 1955	11
1891 — 1895	1	1956 — 1960	26
1896 — 1900	0	1961 — 1965	37*
1901 — 1905	0	1966 — 1970	44*
1906 — 1910	0	1971 — 1975	120

*The totals for 1961 — 1965 and 1966 — 1970 include 1–2 pairs (2–4 birds) which nested in Upper Humber 1963 — 1967, but not the young reared by those birds.

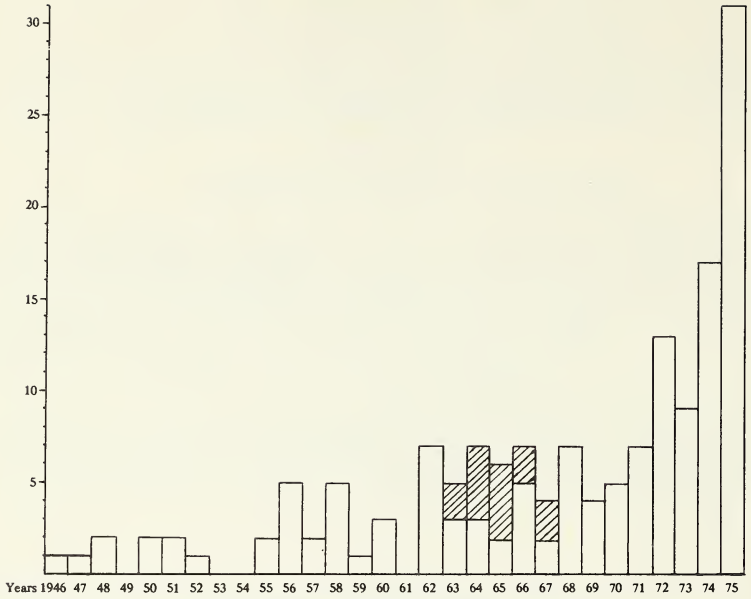


Figure 1. The number of Marsh Harriers *(Circus aeruginosus)* in Yorkshire during the spring period (January — 15th July) in each year between 1946 — 1975. The hatched area on the histogram represents breeding adults at Upper Humber.

years earlier. One to two pairs nested in the Upper Humber area in each of the years 1963 to 1967.

It was perhaps not entirely surprising that the Marsh Harrier should choose to recolonise Yorkshire at Blacktoft Sands, a large tidal reedbed that had only been established since 1945, and as such, one of the largest tracts of *Phragmites australis* outside East Anglia, though Hornsea Mere might perhaps have been chosen. It is of interest that Bearded Tit *Panurus biarmicus* also colonised Blacktoft Sands at this time (Grieve, in prep.).

Why Marsh Harriers did not continue to breed at Blacktoft Sands after 1967 is not known, but a decline had already occurred at other breeding sites in England (Parslow, 1967), and by 1970, only five pairs were known to be nesting in the whole of Britain, all in Suffolk (Ferguson-Lees *et al.*, 1975).

From 1967 to 1970 the Marsh Harrier remained a passage visitor in small numbers to Yorkshire, but from 1971, the species underwent a dramatic increase. This may have reflected increased observer coverage (especially at the main haunts of Blacktoft Sands and Hornsea Mere), but more Marsh Harriers were recorded from the rest of Britain, and increased breeding in East Anglia and elsewhere resulted in perhaps 10 occupied sites in 1976 (Day, in prep.).

The dramatic rise in Yorkshire records since 1971 is mainly attributable to an increase in spring occurrences (see Fig. 1). Of significance is the appearance of adult males in early April, a feature that was very marked during the years 1962–67, when breeding in the Upper Humber occurred. With a situation similar to the 1950's and early 1960's, perhaps the Marsh Harrier may well re-establish itself at Blacktoft Sands if it continues to expand its range.

PRESENT STATUS

The pattern of records for the years 1971–75, and illustrating the present status of Marsh Harriers in Yorkshire is shown in Figure 3. It is a regular passage migrant, commoner in spring than in autumn (see Fig. 2), with a few winter records and the occasional summering bird.

The later spring occurrences are clearly associated with anti-cyclonic weather over the continent and they often arrive with easterly winds. The majority of the birds arriving in May being immatures, presumably of continental origin.

BREEDING IN YORKSHIRE, 1963–67

In 1962, the year prior to breeding in Yorkshire, a pair of Marsh Harriers nested in north-east Lincolnshire, and reared four young, the nest being situated in long grass on the

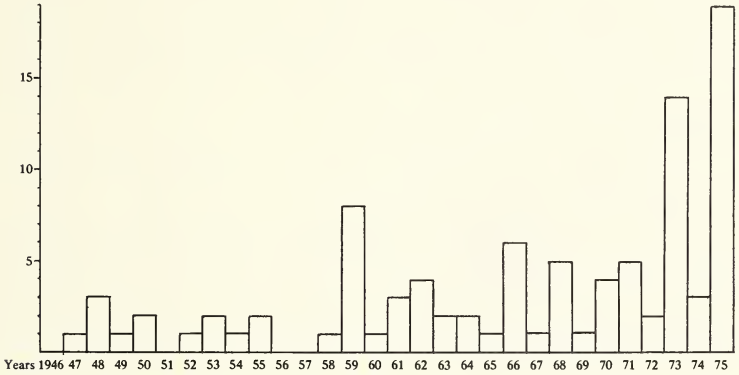


Figure 2. The number of Marsh Harriers *(Circus aeruginosus)* in Yorkshire during the autumn period (16th July — December) in each year between 1946 — 1975.

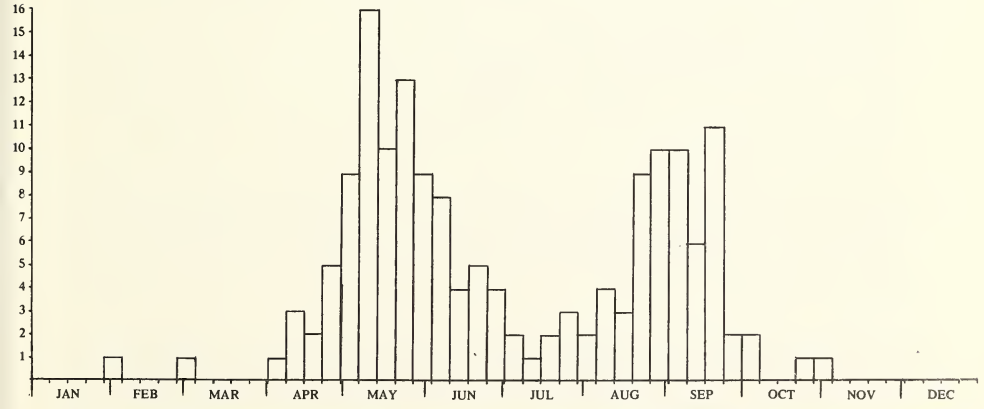


Figure 3. The number of Marsh Harriers *(Circus aeruginosus)* present in Yorkshire, 1971 — 1975, by seven day periods.

saltmarsh at Tetney Haven at the mouth of the Humber. Breeding did not, however, occur at this site in subsequent years (Cornwallis, 1970).

As has already been mentioned, 1962 also saw a large spring influx into Yorkshire, and these two factors provide the background to the breeding of a pair of Marsh Harriers at Blacktoft Sands, nine kilometres east of Goole, at the junction of the rivers Ouse and Trent.

The 1963 breeding

The area had been regularly watched for many years by a local birdwatcher who eventually discovered the harriers nesting. Mr. F. Gilleard from Fockerby had always considered that the species might nest as the area developed, and this proved to be the case when he watched a pair building a nest in late April 1963. In May, a group from the Lincolnshire Naturalists' Union visited the general area and also witnessed Marsh Harriers building. They duly informed J. Cudworth and H. O. Bunce, the V.C. Recorders for that part of Yorkshire and after consultation with R. F. Dickens, it was decided that the event should be kept secret for the time being. An article stating the fact that Marsh Harriers had bred successfully in *"Lincolnshire's Isle of Axholme region"* was *misguidedly published later by a certain Derick Scott in The Birmingham Post*. This might have had disasterous results, but for the fact that the locality was wrongly described as in Lincolnshire, and few Yorkshire watchers (presumably not appreciating that the area was in fact in Yorkshire) ever checked the Blacktoft Sands reedbeds. It was due to the efforts of F. Gilleard and two other local men, J. Gilleard and S. Duften, that a possible attempt to find the nest by a suspicious looking person from Birmingham was thwarted. The R.S.P.B. paid a raptor bounty to these three for their wardening of the site.

The nest was located in the centre of the largest tract of *Phragmites*, near the river Ouse, and in June contained three eggs. Visits to the nest were naturally few and on 27th July it contained three young which later fledged in early August. Observations were made from the north side of the river Ouse during each of the breeding years by H. O. Bunce, and he confirms seeing two young on the wing on 27th August 1963, the third young having unfortunately been found dead under overhead electricity cables in early August and brought to F. Gilleard.

The 1964 breeding

Although it was thought that the pair would return in 1964, especially after being successful the previous year, it was decided that few visits would be made to the site early in the season to allow the birds every chance to settle in without being disturbed. The male arrived in early April, followed by the female, and a brief check in May showed all progressing well with a food pass witnessed. Attention was paid to checking more thoroughly in July with the discovery that there were in fact two pairs nesting, the original site near the river Ouse again being occupied with the new pair nesting in a 100 metre wide strip of reeds alongside the river Trent, between one and two kilometres from the other site. The success of the second pair was threatened by operations on the nearby embankment by the Trent River Authority but due to the efforts of Mr. K. Knothard operations were held up till the young fledged. One of the three eggs disappeared from this nest after a visit by someone posing as a Nature Conservancy Officer, who it was later discovered was a suspected egg collector from Scunthorpe. The remaining two eggs hatched and two young fledged in early August.

Meanwhile, three young flew from the river Ouse nest, a total of five young being reared from these two nests.

The 1965 breeding

The Trent River Authority were still working along the embankment near the Trent in early 1965, so it was not surprising that this pair was disturbed and did not use the site. However, it seems likely that they moved three to four kilometres across the Humber Estuary where a pair nested on the frontage of Broomfleet Island and was successful in rearing three young (Bunce, in prep.).

The original site at Blacktoft Sands, close to the river Ouse, was again occupied and the pair reared two young, making a total of five young raised in 1965 from the two nests in the Upper Humber. In August, F. Gilleard had the unforgettable sight of seven Marsh Harriers in the air at once over Blacktoft Sands, for the young had been brought from Broomfleet Island to Blacktoft Sands by that nesting pair, and three adults and four young were soaring over the reedbeds on that particular day.

A tragic postscript was the shooting of an adult male Marsh Harrier in the autumn of 1965 at Alkborough in Lincolnshire, just four kilometres from Blacktoft Sands, and presumed to be one of the breeding birds.

The 1966 breeding

With the report of a well marked adult being shot the previous autumn, thought to be the male from Broomfleet Island, it was perhaps not surprising that only one pair returned to Blacktoft Sands in spring 1966. This pair nested in the same site which had been used for each of the previous three years, in the large reedbed near the river Ouse, and were successful in rearing three young. A report of a young Marsh Harrier being shot near Saltmarshe, five kilometres from Blacktoft Sands, in the autumn of 1966, was not substantiated.

The 1967 breeding attempt

From the winter of 1966–67, a gamekeeper was employed to control vermin on Blacktoft Sands by the shooting tenants, who at the time leased this area for wildfowling, and undoubtably disturbance in the spring would have increased. More people had learned of the breeding of Marsh Harriers at this site and were visiting the area, and so it was inevitable that the birds would be deterred. The pair returned in April and nest building commenced. A check in May by Miss J. Fairhurst from the vantage point across the river Ouse, revealed all progressing well, with a food pass observed. The pair was again frequenting the traditional nest site near the Ouse. Later checks, however, did not show any breeding activity. It seems likely that something happened to the nest, which at this time probably contained eggs, between mid to late May. The male continued to be seen during the summer, but there was no evidence of a further breeding attempt.

The later years at Blacktoft Sands

In 1968, a female arrived in mid April but no male was seen during the early part of the spring, the male from 1967 failing to re-appear. Although a new male was seen in late May, there was no evidence of a breeding attempt in 1968, and no breeding has occurred at Blacktoft Sands since 1967, despite the appearance of many Marsh Harriers on passage through the area in the spring. (See also postscript.)

Breeding Success

One possible reason for the decline of the Marsh Harrier in the British Isles, is that they breed less successfully that those on the Continent. A comparison of data from the Humber and elsewhere in Britain with information from Europe however, does not altogether prove this. Taking the nesting of the Marsh Harrier on the Humber Estuary as a whole, including Tetney in 1962, Blacktoft Sands from 1963 to 1967 and Broomfleet Island in 1965, the average number of young reared from all known nests (8) was 2.5 with 2.85 from the successful nests (7). Even discounting the success at Tetney in 1962, the figures for the Upper Humber were 2.3 and 2.7 respectively. This compares very favourably with Minsmere where it was 2.3 and 2.7 respectively for the 15 years 1955 to 1970 (Brown, 1976). Data from Sweden give 2.3 young reared from all successful nests in recent years which would be even lower if unsuccessful nests were included (Bengtson, 1967). From Holland, 3.3 young were

reared per successful nest (Haverschmidt, 1953), from Germany it is 3.5 per successful nest (Creutz, 1968), in Lorraine, France, it is 3.7 from successful nests but only 1.57 from all nesting attempt (Thiollay, 1967), and from Finland it is 2.35 from successful nests (Hilden and Kalinainen, 1966).

From this, it can be seen that the nesting success of the harriers on the Humber was lower than some areas on the Continent, but compared favourably with Minsmere, France (nesting attempts), and Sweden and Finland in Scandinavia. This raises the problem of what happens to the young after they have fledged, for the breeding success on the Upper Humber appeared to be sufficient to replace losses of breeding adults, though the species failed to continue nesting there. Did any young from the Humber survive to return in later years?

Hunting area and prey

The nests were very infrequently visited whilst Marsh Harriers were breeding at Broomfleet Island and Blacktoft Sands, but the following prey items were found at the nest sites and so refer to food brought in to the young. Rabbit *(Oryctolagus cuniculus)* appeared to be one of the main items of prey, being recorded in small numbers from both Broomfleet Island and Blacktoft Sands, whilst Brown Rat *(Rattus norvegicus)* was taken in almost equal numbers at Blacktoft Sands. Other than these two major items, few other prey species were noted, but included Moorhen *(Gallinula chloropus)*, young Shelduck *(Tadorna tadorna)*, young Partridge *(Perdix perdix)*, and small numbers of Meadow Pipit *(Anthus pratensis)*.

Though the pair on Broomfleet Island in 1965 actually nested in Sea Aster *(Aster tripolium)* which had grown up where tidal wrack had been deposited (Bunce, in prep.), Marsh Harriers normally nest in reedbeds and use the reedbeds to hunt over. They also tend to hunt over adjacent farmland, as did the harriers breeding in the Upper Humber. By plotting the places where they were seen hunting, it was possible to work out the size of territory required. The one to two pairs which bred on the Upper Humber used an area of about 7,000 acres (2,827 hectares), of which 472 acres (184 ha) consisted of the reedbeds at Blacktoft Sands. This compares with about 4,000 acres (1,620 ha) at Minsmere and also Hickling/Horsey in Norfolk, both of which have slightly larger acreages of reedbed than Blacktoft Sands. These figures compare with 670–1,040 acres (270–420 ha) in the Carmargue, of which only a small part is actual reedbed (Brown, 1976). The larger territories used by the Upper Humber birds possibly indicates that the area is less rich in prey.

Breeding Biology

During the years when breeding occurred in Upper Humber, the birds were summer visitors only, in contrast to Minsmere and Hickling/Horsey, where adults over-wintered (Axell, *pers comm.*). The male usually arrived at Blacktoft Sands in early Aril, the earliest being 2nd April 1967; and the female arriving shortly afterwards (earliest 10th April 1966). It must be pointed out that this also reflects dates of visits to the area by observers. The displays of the male were usually witnessed during April and even during early May when nest building was in progress, and consisted of high flying with lazy wing beats and much calling, and the males plunging dive at the female accompanied by talon grappling. Nest building activities were observed from mid April, with both sexes carrying material but the female taking over and doing most of the building.

The two nests visited at Blacktoft Sands, one each in the years 1963 and 1964, were substantial platforms of reed stems, about 0.6 metres high, with a nesting hollow of about 0.9 metres across. They were constructed in dense reeds up to three metres in height.

Information is available on the dates of laying for only 1963. As a deliberate policy, no visits were made to nests containing eggs when harriers are prone to desert. In 1963, a visit to the nest on 23rd June showed two recently hatched young and an egg. A later check revealed three young. By extrapolating back from this information, the dates of laying for this clutch can be worked out. The incubation period is known to be between 33 and 38 days (Witherby

et al., 1938–41) and is on average 36 days (Brown, 1976; Cambell and Ferguson-Lees, 1972). Allowing that the eggs are laid at two day intervals, in 1963 the first egg was probably laid about 15th May and the clutch of three eggs complete on about 19th May. All three young could fly strongly by 10th August which gives a maximum fledging period of about 47 days. This compares with 47 days for an Anglesey nest and 45 days for Hickling (Brown, 1976).

The data for later years are incomplete, but between 1964–66, the young fledged at a slightly earlier date, between late July and early August, so egg laying would have been somewhere between 1st–15th May for those years. The indication of clutch size from the young fledged is between three and four, as the number of young reared is usually a direct result of number of eggs in a clutch; this is considerably lower than clutch sizes on the Continent, for example Holland has 4.7 and the Carmargue has 4.6 on average (Brown, 1976).

Future Prospects

The recent upsurge of records, especially in the springs of 1975 and 1976, may be the prelude to re-nesting by Marsh Harrier at Blacktoft Sands. In 1974, an adult male stayed for a few hours on 14th April, before leaving high to the north-east.

In 1975, an adult male arrived on 7th April and within a few hours was observed carrying reeds to a site in the main reedbed where breeding had occurred between 1963–67. It stayed till 15th April, during which time nests had been built at four different sites in the main reedbed and display observed but no female was attracted into the area. Between 10th–15th May, a sub-adult male was observed carrying reeds to two sites in the main reedbed, but no display seen, nor was a female present. A sub-adult female arrived on 12th June and 'summered' to 6th August, a stay of eight weeks.

In 1976, an adult male arrived on 12th April, followed by a female on 14th April. During 15th April the male was seen to follow the female up and down the reedbed, flying just behind and above her with shallow, fast, wing beats, but the weather was very bad at the time, and the female was not seen again. The male stayed on to build at one site in the main reedbed until he was last seen on 18th April. A sub-adult male stayed for most of 28th April and was seen nest building at one site in the main reedbed. On 18th May, a new sub-adult male arrived and started carrying reeds to two sites in the main reedbed and to a completely new site towards the village of Ousefleet. A female arrived on 21st May which induced the male to high flying displays, plunging dives, and calling from a great height whilst flying with winnowing wing beats. The female, however, stayed only one more day and the male, after continuing to build nests, left on 24th May. A total of 24 Marsh Harriers passed through Blacktoft Sands in the spring of 1976, with three together on three dates in May. A further eight occurred in the autumn with four together for part of September, making a total of 32 individuals for that year. Hopes are high that the food pass of a pair of breeding Marsh Harriers may once again be witnessed before too long.

Blacktoft Sands was acquired as a Nature Reserve by the Royal Society for the Protection of Birds in November 1973, and as such, has full protection from disturbance with full time wardening.

Summary

The past and present status of the Marsh Harrier in Yorkshire is reviewed, demonstrating the remarkable increase that has occurred in the species since 1946 which culminated in one to two pairs breeding in the Upper Humber between 1963–67. Despite ceasing to nest in Yorkshire since 1967, the species has again increased and may be on threshold of re-colonising Yorkshire, as indicated by increased nest prospecting activity at Blacktoft Sands. The years of breeding are discussed in more detail and the breeding biology of the Yorkshire birds compared to other breeding areas.

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POSTSCRIPT

After an absence of 10 years, Marsh Harriers have returned to breed in Yorkshire, one pair are again nesting at Blacktoft Sands in 1977. At the time of going to press, they have two half-grown young in the nest which are due to fledge in late July. Details will be published in due course.

THE EFFECT ON HEATHER *CALLUNA VULGARIS* OF EXCLUDING SHEEP FROM MOORLAND IN NORTH-EAST ENGLAND

R. HEWSON

Introduction

During August 1970 several moors near Middleton-in-Teesdale, Durham, which had formerly carried good stocks of red grouse *Lagopus lagopus scoticus* but which no longer did so (Fig. 1), were visited to assess the state of the heather and to make recommendations for improving the numbers of grouse. On three moors (B, C and D), with poor or sparse heather, the grouse bags were similar and showed a big decline and poor recovery. On Moor A heather was abundant and flourishing; the decline in numbers was proportionately smaller, with an earlier and better recovery. In most cases a rapid assessment of the state of the heather was made without actual measurement, and advice on burning and other aspects of management was given on this basis. On one moor, Black Hope Hill or Black Hill, the heather was examined in more detail and exclosures were built on this and the adjoining moor, Swinhope Head, to measure the effects of excluding sheep. Both were at an altitude of about 550 m and had been heather or "black" moors up to about 1940. Since then they had become dominated by plants other than heather and were known locally as "white" moors. The grouse bags from these moors are included in the "poor" moors B–D.

The grazing regime was similar on Swinhope Head and Black Hill. Ewes with their lambs were put to the hill after the lambing season and grazed there until November. About 80% of the ewes had lambs. The stocking rates were 2.18 sheep/ha on Black Hill in 1970 and in 1976, and 3.49 sheep/ha on Swinhope in 1970 and 3.28 sheep/ha in 1976. However the stocking rate on Black Hill had been higher before a fence was built to prevent sheep crossing over from Swinhope.

These are similar densities to those found on seasonally grazed high-level grassland in Teesdale by Rawes and Welch (1964) i.e. between 2.25 to 4.25 sheep per ha; the long history of sheep grazing in the area is reviewed by Welch and Rawes (1966).

Methods

On Black Hill the heather cover was assessed by using a 0.25 m^2 quadrat in August 1970, and by estimating heather cover on 1 m^2 by eye at 10-pace intervals in August 1976 on both moors. Four exclosures about 4 m square were built in 1970, two on Swinhope and two on Black Hill. Heather cover inside them was assessed by eye on an estimated 1 m^2 in each of the four corners of each exclosure in 1976. Five or six representative flower shoots were picked in each exclosure to measure the current year's growth.

Results

On Black Hill in August 1976 the heather appeared to be flowering better and to be less degenerate in form than six years earlier. In 1970 the heather cover was about 23% but the plants were woody and degenerate in form, and more than a third of them appeared dead (Table 1). The heather was dominated and partly concealed by *Eriophorum* spp. Shoot length was about 34 mm (Table 2). Too few measurements were taken on Black Hill to make wholly valid comparisons with the heather in August 1970, but in 1976, although heather cover was only slightly greater (34%), the plants no longer appeared degenerate in form and no dead plants were noticed. The vegetation within the exclosures was clearly dominated by heather (78% and 53% cover) which was vigorous in growth and flowering profusely. The longer flower shoots, 72 mm in Excl. 3 and 93 mm in Excl. 4, were typical of heather recovering from heavy grazing pressure.

The original recommendation for management was that exclosures should be built on Black Hill only, and the heather on Swinhope Head was consequently not examined in 1970. This moor, which had been separated by a fence from Black Hill a few years earlier, was more heavily grazed, and heather was uncommon, certainly below 5% of the plant cover of *Eriophorum*, *Nardus stricta* and *Agrostis/Festuca* grasses. The results of excluding sheep were much more striking than on Black Hill, and heather covered a third to more than half the two exclosures (Table 1). Shoot length in 1976 (76 mm in Excl. 1 and 99 mm in Excl. 2) was similar to the heather on Black Hill (Table 2).

Discussion

It is possible that the total exclusion of sheep from these two moors for a period of seven years would have restored them to their original status as grouse moors. Even with a ewe and lamb to 0.8 ha on Black Hill some recovery of heather was taking place, but at the heavier grazing



Figure 1. Mean annual bags (brace) of grouse in each 10-year period on four moors (A–D) near Middleton-in-Teesdale.

rate on Swinhope heather was still suppressed. However it showed an even greater capacity for recovery than on Black Hill. Moorland carrying good stocks of grouse and with a ewe and lamb to 1.2 ha occurred nearby on Moor A (Fig. 1) but there was no evidence that this moor had ever been over-stocked. With no change in the stocking rate heather cover might continue to improve on Black Hill, though slowly, but possibly it could not become long enough for grouse to feed on it without a reduction in grazing. On Swinhope an improvement in heather is improbable under the present grazing regime.

Table 1. Heather cover, per cent (means ± s.e.)

	Outside exclosures		Inside exclosures	
	Aug. 1970	Aug. 1976	Aug. 1976	
Black Hill	23 ± 10	34 ± 7	78 ± 3	53 ± 9
Swinhope	—	< 5	34 ± 7	58 ± 6

Table 2. Length (mm) of flowering shoots of heather inside exclosures and on open moorland (means ± s.e.)

	Inside exclosures		On open moor
	Aug. 1976	Aug. 1976	Aug. 1970
Black Hill	72 ± 6	93 ± 6	34 ± 6
Swinhope	76 ± 5	99 ± 3	—

Welch and Rawes (1966) found that on blanket peat at 550 m in Teesdale a grazing pressure of less than 0.63 sheep/ha throughout the year was necessary to maintain heather long enough for winter food. Heavier grazing maintained old heather which was too short to provide food during snow. It is difficult to compare moorland on blanket peat with moorland on drier soils, and seasonal with continuous grazing, particularly as heather tends to be more heavily grazed in winter (Grant *et al.* 1976). Doubling the density for summer grazing might give a comparison of sorts, and this shows that grazing was several times higher on Swinhope and Black Hill than on the area studied by Welch and Rawes. But a summer grazing density of about 3 sheep/ha was clearly enough to suppress heather on Swinhope, whereas at 2 sheep/ha on Black Hill the proportion of heather was increasing and the plants were more vigorous.

The replacement of heather by grasses may be desirable for sheep farming but not for grouse production. The customary burning of large areas of moorland for sheep grazing leads to the suppression of heather, but Lance and Triggs (1974) have shown that on bogland in western Ireland the small fires normally burnt on grouse moors produced an improvement in lambing performance. With a reduction of grazing pressure over-grazed heather can recover quickly. The problems are to decide on the objects of moorland management, and to adjust the regime of burning and grazing accordingly. More than a hundred years ago Octavius Smith removed the sheep from part of his estate in Argyll and increased the numbers of grouse (Gaskell, 1968).

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BOOK REVIEWS

Deer by **R. E. Chaplin.** Pp. 218, with 64 black and white illustrations and 32 colour photographs. Blandford. 1977. £5.75.

Mr. Chaplin is well qualified through his wide practical and scientific experience of deer to write on their biology. His intimate knowledge of these animals emerges in this very useful contribution, the first in the new Blandford Mammal Series.

Each chapter considers a particular aspect of deer biology, ecology and behaviour. The first three chapters consider the worldwide distribution and status of deer. These are followed by chapters on form and function, the senses, social organisation, food and feeding, antlers, several chapters on reproduction and postembryonic development, and finally health and disease. All in all, a comprehensive coverage which is supported by useful tables of data, clear uncomplicated diagrams and a large number of photographs.

On reading the book one cannot help but feel that its general organisation could have been tightened up somewhat. For example, chapter two on Names and the Future could profitably have been incorporated into the preceding and subsequent chapters on deer and their world, and threatened deer of the world. Similarly, much of the material on form and function could have advantageously been incorporated into the later chapters — the description of the reproductive systems could surely have prefaced the chapter on reproduction.

The balance of material is good with possibly a slight bias to reproduction and development. For a book that is presumably largely designed for a British (and European?) audience it seems strange that the food and feed habits should dwell so much on North American examples when there is a wealth of information available on British deer, e.g., fallow deer in the New Forest. The book is commendably free from mistakes although there is an error on nomenclatural procedure on page 16.

These are relatively few minor criticisms of a basically useful book. It is written for a wide readership and has much to offer the inexperienced naturalist who wishes to widen his knowledge of deer as well as the specialist mammal biologist. This book augurs well for this new and important series.

M.J.D.

Back in the Wild by **Sue Hart.** Pp. 158, including 46 line drawings by **Leigh Voigt.** Collins and Harvill Press. £5.50

The supply of wildlife books on Africa seems endless. Miss Hart has already written several books on her experiences as a veterinary surgeon in Africa. This, her latest book, is a compilation of forty-eight weekly features from the Rand Daily Mail. She writes well and covers a wide range of wildlife topics over an extensive geographical area from East Africa to Namibia. This is light, easy and interesting reading on the birds, mammals, insects and other forms of wildlife in Africa. Mrs. Voigt's illustrations are executed with great skill and delicacy.

M.J.D.

THE GASTROPOD FAUNA OF THE HUDDERSFIELD NARROW CANAL

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A survey in 1972 showed the Huddersfield Narrow Canal to be the haunt of 10 lamellibranchs of the family Sphaeriidae which were distributed zonally down its length (Watkin and Morphy, 1976). A sequel to the earlier study, the present paper reports the results of a similar survey of the gastropod fauna of the canal.

Methods

The study was carried out in 1975 and the approach was similar to that used in the earlier survey; standard sweep samples were taken with a pond net (1 mm mesh) at 200 m intervals down the length of the canal; for further details see Watkin and Morphy *(op. cit.)*. In addition, a search and collection of snails, occupying approximately 5 minutes, was made at each station.

A total of 60 stations was sampled, compared with 65 in the earlier study. Stations 7, 11, 26, 59 and 60 of the original study were not sampled on this occasion; the stretch of canal incorporating the latter two stations had been culverted in the interim. Using the upper series of station numbering in Figure 1 ("station numbering — first survey"), the map produced for the 1972 survey *(op. cit.)* shows the positions of stations sampled in the present study.

Results

The survey revealed a total of eleven species of gastropods, and their distributions are shown in Figure 1. Most widespread was the prosobranch, *Potamopyrgus jenkinsi*, which was recorded at 67% of the stations. First appearing at station 5, this species occurred further up the canal than any of the other snails. At station 8 it was joined by the two Pulmonates, *Gyraulus albus* and *Lymnaea peregra*, which ranged down to station 60; *P. jenkinsi*, on the other hand, was absent from the last 5 stations (56–60). Ranging from stations 14–41, the River Limpet, *Ancylus fluviatilis*, was next, followed by *Planorbarius corneus*, which occurred at only two widely-separated stations, 27 and 60.

At station 32, *Menetus dilatatus* and a species of *Physa* made their first appearance together; both possess similar patterns of distribution in the Huddersfield Narrow. However, *Menetus dilatatus* does not appear to occur below station 56, a point borne out not only by the present survey, but also by the fact that this species has never been recorded between stations 57–60, a length of canal which has been studied intensively over the past six years. With the confusion surrounding the status of certain members of the *Physa* group in Britain (Ellis, 1969), precise identification of this species is not possible at the present time.

Continuing the sequence, *Lymnaea auricularia*, which was confined to stations 35 and 36, was followed by *Lymnaea stagnalis*, which ranged from station 49 to 60. Finally, at Huddersfield Wharf, two more planorbids appeared — *Planorbis carinatus* and *Bathyomphalus contortus*, making this, with seven species, the richest snail station.

Long term intensive studies at 3 locations on the canal over the past six years, have yielded some additional recordings which are included in Figure 1. This supplementary material provides some evidence to indicate the value of such surveys. At station 33, an 18-month study involving snail sampling at 3-week intervals revealed the presence of only one additional species — the diminutive and easily-overlooked snail, *Armiger crista*, which,

compared with *P. jenkinsi*, *Physa sp* and *M. dilatatus*, was scarce. Likewise, *Bithynia tentaculata* is the only other species known from station 60, but it has not been found there for at least 3 years. For the earlier study (Watkin and Morphy, *op cit.*), a subsequent 12-month programme of sampling between stations 1 and 2 revealed only one other lamellibranch, *Pisidium hibernicum*, again at very low density.

Since occurrence in this case is a function of the probability of capture, which in turn is a function of population density and accessibility to sampling, surveys of this sort cannot provide a definitive picture of distribution. Nevertheless, the above observations suggest that in this and the previous survey the major features of distribution have been identified.

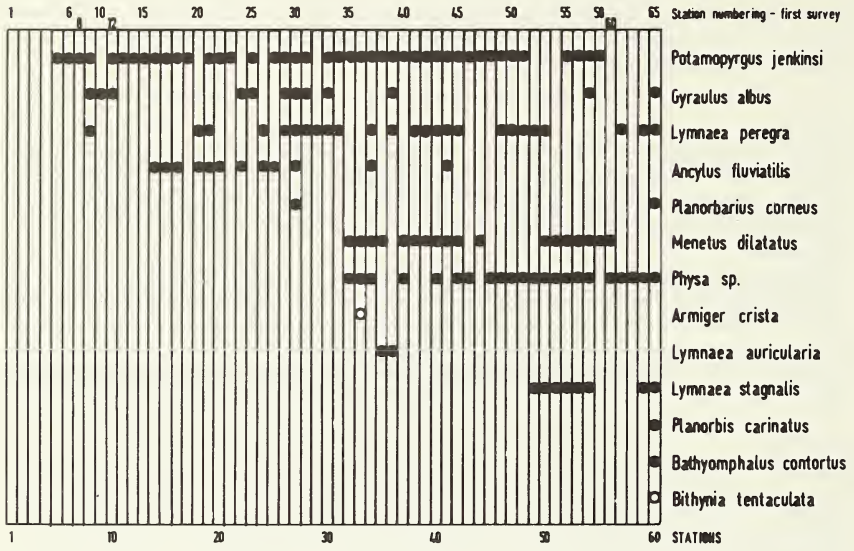


Figure 1. The distribution of gastropods in the Huddersfield Narrow Canal. Solid circles = 1975 survey; open circles = other recordings.

Discussion

Whilst all the species recorded in this survey have been reported previously for vice-county 63, York South West (Ellis, 1951), the occurrence of *Bithynia tentaculata*, *Gyraulus albus*, *Lymnaea auricularia* and *Armiger crista* in SE11, and of *Menetus dilatatus* in SE01, represent new records for these 10 km squares (Kerney, 1976). The new *Menetus dilatatus* record has already been reported (Norris, 1974).

The most interesting so far as distribution is concerned is *Menetus dilatatus* for which the Huddersfield Narrow appears to be the only remaining recently-recorded site in Northern England (Kerney, 1976). Believed to be an introduced species from North America (Ellis, 1969), it was first recorded in Britain by Rogers (1870) at a canal site near Manchester, and was subsequently found at other localities in the Manchester and Burnley areas. In 1953 Fryer found it in the Huddersfield Narrow at Golcar; this was the first record for the species east of the Pennines. (Morehouse, 1954; Fryer, 1954).

The first Welsh find was by Dance at Llyn Trawsfynydd, Merioneth in 1969. As the species had not been found at any of the original Lancashire sites for over 25 years, and as a further Scottish record had been viewed with some scepticism, Dance was led to suggest that Llyn Trawsfyndd might be the only remaining site for *M. dilatatus* in Britain (Dance, 1970). However, he made no mention of Fryer's Yorkshire find, and in any case subsequent discoveries have shown that his suggestion was incorrect. In 1970, Dance himself found other sites for the species at Llyn Mair, Merioneth (Kerney, 1971) and more recently Rundle (Kerney, 1975) has discovered several sites in the Grand Union Canal, the first records for this species in the south of England.

It is therefore encouraging to report the continued existence of a thriving population of *Menetus dilatatus* in the Huddersfield Narrow. Fryer's site lay between stations 36 and 38 of the present survey (Fryer, pers. comm.) corresponding to stations 39 and 41 on the map in Watkin and Morphy (1976). On the basis of the present survey, the species is seen to range from about 1 km above to about 3½ km below the point where it was originally discovered. It is therefore more widespread in the Huddersfield Narrow than was formerly supposed.

As with the Sphaeriidae study (Watkin and Morphy, 1976) the present survey reveals a marked zoning of snail species, but in contrast, the gastropods show the greatest diversity of species in the lower reaches. A comparison of the results of the two surveys shows that the mollusc fauna changes from one dominated by lamellibranchs in the upper reaches, to one dominated by gastropods in the lower. For instance, comparison of the top 10 stations with the bottom 10, shows that in the former the lamellibranchs comprise 70% of the mollusc fauna, whilst in the latter 60% of the species are gastropods. In the middle section, on the other hand, the relationship is 50:50.

Clearly these studies reveal some intriguing problems of distribution which will be the subject of a later paper.

ACKNOWLEDGEMENTS

We wish to thank the staff of the Biochemistry Section and R. Lumb of the Division of Life Sciences, Huddersfield Polytechnic, for valuable assistance with the field work, Dr. L. Lloyd-Evans for his help with identifications, and the British Waterways Board for permission to carry out the work.

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BOOK REVIEWS

Rare Birds in Britain and Ireland by **J. T. R. Sharrock** and **E. M. Sharrock**. Pp. 336 with numerous line drawings and maps. T. and A. D. Poyser, Berkhamsted. 1976. £6.00.

This beautifully produced book details all the records of 221 rare species. Those occurring before 1958 when the *British Birds* Rarities Committee was formed are merely summarised or listed, but those for the years 1958 to 1972 are analysed in detail. Outline maps of the British Isles accompany most species and the records are shown by varying sized dots within each county, making it easy to appreciate at a glance where the rarities have occurred.

It is not an identification work but each species is given a few lines of description and is illustrated by a line drawing, some of which could be criticised but this does not affect the overall excellence of the production. Yet another book about birds which will have a limited appeal; students of the national bird scene and the "twitching brigade" will certainly buy it but I suspect it will make dull reading for the pure bird lover.

J.R.M.

Beetles in Colour by **Leif Lynebord**. Pp. 186, with 47 colour plates by **Niels Jønsson**. Blandford. 1977. £3.25.

There is no easy way to identify beetles accurately and anyone aspiring to become a competent coleopterist must accept that at the outset and be prepared for much hard work and study. Coffee table volumes such as this do little to assist the would-be entomologist and in spite of the misleading claim made on the dust jacket this book can in no way be described as a 'superior field guide'.

The pictures are beautifully done but unfortunately approximately one third of the species illustrated are not British and of the rest many are unlikely to be encountered by most collectors. The species illustrated are not drawn to scale, neither has the artist taken the old fashioned, but useful, step of putting a line against each species to show the actual length. The text which is largely devoted to comments on the species illustrated is interesting, especially the notes on habitats and habits, but a lot of it is largely superfluous in view of the fact that the book can hardly be usefully employed to identify beetles. It may, however, encourage the reader to take a deeper interest in these insects, but I doubt it.

R.C.

A Key to British Freshwater Megaloptera and Neuroptera by **J. M. Elliott**, Pp. 52, with 1 plate and 18 figures. Publication No. 35, Freshwater Biological Association. 1977. £1.00.

Dr. Elliott's publication is a completely re-written edition of F.B.A. S.P. 18 by D. E. Kimmins. It is twice the length of the former edition. Dr. Elliott has given a much fuller treatment in the taxonomic section, with some admirable additional illustrations (by C. Joan Worthington) showing useful structural details. For example the rather unsatisfactory colour characters used for separating the larvae of the two common species of alder fly are here supplemented by good structural characters clearly illustrated.

Another useful addition to the taxonomic section is the inclusion in the Keys to families (for both larvae and adults) of the non-aquatic families. This will greatly help many students, who not infrequently find lacewings resting amongst emergent vegetation or who turn up the occasional lacewing larva at the edge of a water body.

In the section on life cycles and ecology Dr. Elliott has compiled a most useful summary of what is known and an excellent review of the literature.

The one unfortunate feature of this edition is that while it was at the printers a third species of *Sialis* was recognised for the British fauna. This was inserted as a last minute footnote on page 14. It means this otherwise excellent publication is already out of date, in that there is no taxonomic treatment of *Sialis nigripes*, which has been recorded from Ireland, Surrey, Dorset and Somerset.

R.H.L.D.

IN THE WAKE OF THE CLEAN AIR ACT? A NOTE ON THE LICHENS OF A LEEDS ALLEYWAY

A. HENDERSON

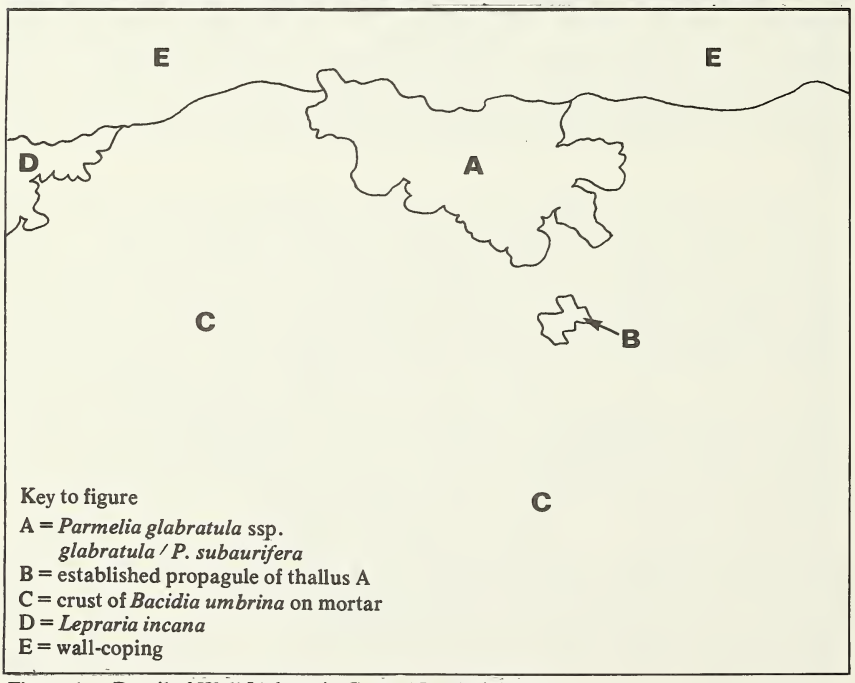
The near-stoicism of certain lichens in the face of urban pollution is well-known. The species found growing nearest to industrialised city-centres are crustose ones, although some foliose and squamulose species of calcicolous disposition (i.e. in the Leeds area, *Lecanora muralis*, *Physcia adscendens*, *P. tenella*, *P. orbicularis* and *Xanthoria parietina*) at times run them a close second, exploiting the liberally available asbestos-cement and mortar of inner city areas. In comparison, those foliose taxa of acidophilous inclination which occur nearest to pollutive sources, e.g. *Hypogymnia physodes* and *Parmelia saxatilis*, show a pronounced reticence in their approach. In the Leeds area careful fieldwork (Seaward, 1975) has established inner distributional limits for several such species. Recent records (1975-76), however, suggest incipient changes in some of these limits, possibly in response to the atmospheric improvement which has followed the implementation of the Clean Air Act of 1956.

The most striking instance of such records comes from part of an old, narrow alleyway in the Woodhouse area (G.R.44/2835). At a distance of less than 3km from City Square, this footpath or "snicket" runs for a length of *c*300m in a north-westerly direction from near Hyde Park towards the southern brow of Meanwood Ridge Valley. It is intersected by three residential roads, each with a moderate, private-car traffic. The penultimate section, nearing the Ridge, is approximately 1.2m wide, 100m long, has sandstone walls of a mean height of 1.8m (1.75–2.05m), and is overlooked by the hedges and mature deciduous trees of the raised gardens behind. The dominant lichen flora is limited and typical of such a damp, sheltered and semi-shaded, urban micro-climate in the West Riding, and consists of the crustose species, *Bacidia umbrina*, *Lecanora conizaeoides*, *L. dispersa*, *Lepraria incana* and *Verrucaria muralis*. In addition *Candelariella aurella*, *Lecanora muralis* and *Physcia tenella* occur infrequently, and *Thelidium mesotropum* grows extremely locally on the cement-aggregate and mortar of an old stone bollard by a paving-stone footbridge over the passage-way.

Surprisingly, there are also present two young plants, one growing on sandstone, the other on mortar, of *Parmelia saxatilis/sulcata*. (It is often impossible, as here, to differentiate between immature thalli of these two species.) The adoption of "buffered" alkaline substrates by *P. saxatilis* and other lichen species under pollution-stress has been considered by Gilbert (1971), Seaward (1975) and Earland-Bennett (1975), and can be viewed as a survival-mechanism. As the nearest point of encroachment upon the city centre for *P. saxatilis* on the previously established distributional limit is over 2km further out at Meanwood Park (G.R.44/2737) and as the nearest recorded site for *P. sulcata* is on the sandstone ha-ha wall at Lotherton Park (G.R.44/449360), 15km distant, the alleyway records signal an impressive incursion of one of these species into the inner urban area. Added to this is the occurrence on the roadside garden-wall opposite this stretch of alleyway of a thallus of *Hypogymnia physodes*. (Two thalli of this species have also been found on the border-stones in a garden adjacent to the alley, and there is a further plant growing on the peeling bark of a crab-apple stump in a similarly placed garden.)

Even more unexpected is a thallus, on the alley's north-east wall, of a brown-green *Parmelia* species (Fig. 1), measuring 12.5×7.5mm, and growing on mortar-pointing (pH 8.2–8.3) immediately below the coping, 1.75m above the ground and under beech canopy. This plant is either *Parmelia glabratula* ssp. *glabratula* or *P. subaurifera* (the medulla showing a red reaction in calcium hypochlorite). Its morphology is strongly suggestive of the former taxon: the thallus is somewhat glossy towards the lobe-ends and there is no sign of the clustering or conglomerate sorediatior of isidia typical of *P.*





Key to figure

A = *Parmelia glabratula* ssp. *glabratula / P. subaurifera*
B = established propagule of thallus A
C = crust of *Bacidia umbrina* on mortar
D = *Lepraria incana*
E = wall-coping

Figure 1. Detail of Wall Lichens in Central Leeds Alleyway.

subaurifera (though these might well be absent in so juvenile a thallus). On the other hand, "microscopic preparation of the lower cortex and rhizinae failed to demonstrate the positive (purple) reaction with potassium hydroxide which is characteristic of *P. glabratula*, but often confined to mature thalli." (B. J. Coppins *in litt.*) Consequently, a specific determination cannot be made at this stage of the plant's development. Whichever of the two possible determinations later proves correct, it marks a decided "leap" into inner Leeds for that taxon.

Both *Parmelia subaurifera* and *P. glabratula* ssp. *glabratula* are preferentially corticolous or lignicolous: the nearest records to the city centre for *P. subaurifera* are of corticolous thalli (on *Acer*) at Luddenden Dean, nr. Halifax (G.R.44/022295) at a distance of 28km (P. M. Earland-Bennett, *in litt.*), those for *P. glabratula* ssp. *glabratula* (also on *Acer*) are from Bolton Woods (G.R.44/076553) 31km distant *(idem)*, although there is a possible saxicolous record from near Lindley Reservoir (G.R. 44/219485), 17km distant.

Perhaps the most significant feature of the alleyway plant, however, is the accompanying propagule (Fig. 1, B). This propagule most probably originated in either an isidial or other thalline fragment liberated by animal (e.g. insect or mollusc) or rain action, and then transported by gravity and/or wind, and/or rain (Bailey, 1976) to the niche it occupies just above a thickening of the *Bacidia umbrina* crust (Fig. 1, C). This example of propagation implies that such a situation, so close to the city centre, is now a habitat quite acceptable to this intruding taxon. It is both unexpected and gratifying to find the plant growing so near "the hub of Leeds".

ACKNOWLEDGEMENTS

I would like to thank Mr. A. Thompson for the production of a fine colour-transparency and Miss S. Alexander for processing from it the black-and-white print used to illustrate this note. I am also indebted to Mr. B. J. Coppins for the confirmation of critical *Parmelia* material, and to him, Dr. D. L. Hawksworth and Dr. M. R. D. Seaward for their informed and guiding comments on the draft manuscript.

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FIELD NOTE

Notes on South Yorkshire Roe Deer

Through the good offices of Mr. D. Owen, a roe deer, *Capreolus capreolus* (L.), which had drowned amongst the broken ice in the Stainforth/Keadby Canal near Ashfield Bank (Grid ref. 44/6613) on 1st January 1977, was acquired for Doncaster Museum. The specimen, a fine well-nourished doe, measured 107 cm. in length and 74 cm. at the shoulder, but unfortunately scavenging by local dogs rendered it unfit for display purposes.

The stomach contents were removed and analysed in order to investigate the winter feeding habits of this animal which had been thriving in a largely arable area, the only suitable cover and wild forage being stretches of unkempt railway and canal embankments and extensive though diminishing networks of ancient hedgerows and green lanes of the nearby Fishlake district. Each gastric chamber was reasonably distended, containing a mulch of well masticated plant material weighing on removal 997 gm. and producing a dry weight of 126 gm. The matrix consisted to a large degree of fibrous remains and crushed

bark of bramble twigs together with the remains of many small bramble leaves and shoots. Evidently an important winter food source, the bramble is an abundant hedgerow plant in the area and a vigorous colonist of local waste land. Grass remains were also much in evidence, though the fibrous nature of the fodder suggested coarse wild species rather than the newly sprouting early cereals. The less digested blades matched those of *Glyceria maxima* a plant still showing green and lush in the nearby dykes. An almost complete though well chewed acorn, together with large quantities of well ground acorn pericarp and cotyledon were evidence of the exploitation of this plentiful crop, *Quercus robur* being an important component of nearby hedgerows. A trace of a leaf of a *Brassica* sp., possibly kale, suggested that cultivated land had been visited and two leaves of chickweed, probably *Stellaria media*, indicated field edge feeding. It is significant that in an area with abundant opportunity for the exploitation of cultivated crops, particularly during the period of snow and frost, this large herbivore had fed almost entirely on wild plants.

It seems likely that roe deer extended into the Doncaster Metropolitan district during the late 1960's (a review of the history and spread of the roe in Yorkshire is currently in preparation). From here, animals have spread to the Lincolnshire border, the first being seen on Rainsbutt Moor (44/7616) in 1972 (C. Wall) and down to the Nottinghamshire border, where the first one recorded had been shot near Thorpe Salvin (43/5281) in 1972 (Dr. R. Paget).

With the relative paucity of cover in arable areas of South Yorkshire, roe are more vulnerable to disturbance and illegal shooting than in their north Yorkshire strongholds. Progressive tree felling and clearance of old hedgerows and rough scrubland is further disturbing and diminishing available cover. The spate of recent reported sightings and fatalities (see Doncaster Museum Records) seems closely connected with such activities; e.g. at East Cowick (44/6520) a roe departed across open country from a copse in process of being felled, and at Wyndthorpe Hall (44/6307) similar disturbance of cover led to a fatality on the A.18.

C. A. Howes

LETTER TO THE EDITOR

13.7.1977

Dear Sir,

Botanists out and about in the Dales this spring cannot have failed to notice what a bumper year it has been for winter-annuals, particularly *Erophila verna*. I would be most interested to hear how others account for this exceptional abundance, particularly as the winter was not a favourable one for overwintering herbaceous plants. Meanwhile I put forward a few possible explanations.

Firstly, last summer's drought may have reduced or eliminated competition from perennials at the time of germination in early autumn. Secondly, there may have been exceptionally large amounts of nutrients available once the drought broke, due to release from roots which died as a result of the drought on the one hand and lack of uptake by droughted plants during the summer on the other. Thirdly, the exceptionally warm wet September will have favoured germination, the establishment of seedlings and rapid vegetative growth. Fourthly, the cold spring this year will have been to the advantage of winter-annuals which tend to grow more rapidly than do the associated perennials when air-temperatures are low and which are therefore subjected to less competition than they are in warmer springs.

Yours, etc.

Dr. S. C. Clark
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The University of Leeds
Leeds LS2 9JT

BRYOLOGICAL MEETING AT SANDBURN WOODS (V.C. 62) ON 16th APRIL, 1977

F. E. BRANSON

The four members who attended this meeting, Miss M. Dalby and Messrs F. E. Branson, D. R. Grant and E. Thompson, were well rewarded by the beautiful spring day and in the variety of bryophytes seen. Unfortunately our Vice-Chairman, Mr. G. A. Shaw, was prevented from attending by illness. The route taken was a ride through the woods (mixed conifers), then on to sandy heathland (World's End), through some marshy heathland, then along the edge of Strensall Common and so back to the road and the starting point. The walk through the woods showed a large amount of the small moss *Aulacomnium androgynum* (Hedw.) Schwaegr., very fine material and quite a picture with the myriads of gemmae arising from the summits of the plants on stalks approx. 7 mm long forming a roundish ball at the top and resembling a miniature "drum-stick". This is a dioecious moss and the means of reproduction are by gemmae as the capsules are very rare. There was also some very fine *Dicranella heteromalla* (Hedw.) Schimp. (c. fr.) and among the trees patches of the large moss *Polytrichum formosum* Hedw. with setae and young capsules. Miss Dalby collected a specimen of *Plagiothecium curvifolium* Schlieph. ex Limpr. (c. fr.) on a rotten stump in the woods. I find this is one of the more uncommon *Plagiothecia*. I myself collected *P. denticulatum* (Hedw.) B., S. and G. from the same area.

On sandy heathland at World's End there was an abundance of *Brachythecium albicans* (Hedw.) B., S. & G. with its wormlike golden coloured stems covering sandy banks and tracks. This is a typical plant of sandy and gravelly areas, occurring frequently on sand dunes on the coast. Also here was *Polytrichum piliferum* Hedw. and *P. juniperinum* Hedw. The marshy ground produced the seven species of *Sphagna* and among them Miss Dalby found a few stems of the hepatic *Cephalozia connivens* (Dicks.) Lindb. There was also quantities of the marsh-loving species *Leucobryum glaucum* (Hedw.) Schimp., *Aulacomnium palustre* (Hedw.) Schwaegr., *Drepanocladus fluitans* (Hedw.) Warnst. and *Polytrichum commune* Hedw. On the edge of Strensall Common (typical heathland) was *Hypnum cupressiforme* var. *ericetorum* B., S. & G. and the two hepatics *Cephalozia bicuspidata* (L.) Dum. and *Odontoschisma sphagni* (Dicks) Dum. were found on wet ground.

The following list gives additional species to those mentioned above. Although there are no oustanding species, our brief survey provides a fair reflection of the bryophyte flora of the area.

HEPATICAE

Thallose:

Pellia epiphylla

Foliose:

Lepidozia reptans
Calypogeia fissa
Lophozia ventricosa
Gymnocolea inflata
Lophocolea bidentata
L. cuspidata
L. heterophylla

MUSCI

Sphagna:

S. palustre
S. compactum
S. recurvum
S. tenellum
S. cuspidatum
S. fimbriatum
S. subsecundum var. *auriculatum*

Acrocarpi:

Atrichum undulatum (c. fr.)
Polytrichum aloides (c. fr.)
Ceratodon purpureus var. *purpureus*
Campylopus pyriformis
C. flexuosus
Barbus convoluta
B. unguiculata
Funaria hygrometrica (c. fr.)
Orthodontium lineare (c. fr.)
Pohlia nutans (c. fr.)
Bryum pseudotriquetrum
B. caespiticium
B. argenteum
B. bicolor
Mnium hornum (c. fr.)
M. undulatum

Pleurocarpi:

Amblystegium serpens (c. fr.)
Acrocladium cuspidatum
Brachythecium rutabulum
B. rivulare
Eurhynchium praelongum
Pseudocleropodium purum
Pleurozium schreberi
Isopterygium elegans
Hypnum cupressiforme
Rhytidiadelphus squarrosus

Nomenclature follows *Census CAtalogue of British Hepatics* (4th edition) by J. A. Paton and *Census Catalogue of British Mosses* (3rd edition) by E. F. Warburg.

AUTUMN FUNGUS FORAY
Whitby, 9 to 13 September 1976

T. F. HERING

It is some years since we last visited this beautiful and potentially fungus-rich area, so it is disappointing to record that the weather was unkind. High winds, heavy rain and flooding in the Esk valley all made collecting difficult. In addition the variety of fungi was restricted by the effect of two hot dry summers. The mycorrhizal higher fungi were obviously hard hit, and we cannot remember another autumn foray at which no *Russula* and no *Amanita* was recorded.

I am indebted to Mr. W. G. Bramley and Dr. R. Watling for surprisingly long lists, considering the circumstances; and to Mr. P. Earland-Bennett for a list of lichens.

L = Littlebeck NZ/879049,
M = Mulgrave Woods NZ/868123,
B = Beggar's Bridge and Arncliff Woods NZ/794055,
G = Grinkle Park NZ/741148,
* = new to Yorkshire

ERYSIPHALES (W.G.B.)

Erysiphe fuliginea on *Taraxacum* L
**Microsphaera alphitoides* on *Quercus* (cleistothecial)

DISCOMYCETES (W.G.B., P.M.E-B.)

Anthracobia melaloma B
Hymenoscyphus imberbe on *Corylus* L
H. scutula on *Filipendula* L
Polydesmia pruinosa on *Diatrypella favacea* L

PYRENOMYCETES (R.W.)

**Guignardia philoprina* on *Rhododendron* G

UREDINALES (W.G.B.)

Puccinia arenariae on *Silene dioica* M
P. graminis on *Deschampsia caespitosa* (uredospores) L

AGARICALES (R.W.)
Paxillus rubicundulus with *Alnus* B
Pleurotus dryinus on *Fraxinus* M
Laccaria striatula L
Coprinus leiocephalus Orton L
C. hiascens G
C. stellatus L
Pluteus salicinus M

OTHER BASIDIOMYCETES (R.W.)
Athelia epiphylla G
Botryobasidium subcoronatum G
Calocera glossoides G
Dacrymyces capitatus G

FUNGI IMPERFECTI (W.G.B., R.W.)
Fusicladium dendriticum on *Malus* L
Monilinia fructigena on *Malus* L
Phoma rhodorae on *Rhododendron* G
**Pycnostysanus azaleae* on *Rhododendron* G

LICHENS (P.M.E-B.)
Buellia alboatra on sandstone B
Calicium viride on *Quercus* M
Caloplaca ferruginea on sandstone B
Haematomma ochroleucum vars. *ochroleucum* and *porphyrium* on sandstone B
Lecanactis abietina on *Fraxinus* L
Lecidea symmicta on wood B
Lepraria candelaris on *Quercus* B
Micaria lignaria on sandstone B
Opegrapha saxatilis on *Fraxinus* M; on *Alnus* B
Pertusaria hemisphaerica on *Ulmus* B
Ramalina farinacea on *Fraxinus* M
Schismatomma decolorans on *Fraxinus* M

BOTANICAL REPORTS FOR 1975 AND 1976

FLOWERING-PLANTS AND FERNS

The recorders wish to thank all those who have contributed to these reports. Unless otherwise stated the species included are those which are new to the 10km grid-square and are recorded in the *Atlas of the British Flora* for fewer than ten 10km squares of the vice-county. The figures indicate 10km squares. † new county record. *new vice-county record.

In each vice-county list, names of contributors are given the first time each occurs and thereafter initials are used.

1975

EAST YORKSHIRE (V.C. 61) (E. Crackles)

The two records of outstanding interest for 1975 are for *Apium nodiflorum* x *A. repens* and *Myosurus minimus*. The hybrid *Apium nodiflorum* x *A. repens* has been located in a meadow by the side of Hornsea Mere, a few yards from a reed bed and represents at least a new vice-county record. A separate account of this discovery and related matters was published in *The Naturalist*. *Myosurus minimus* was found on a small track, through a gateway into a boggy field, by Mr. E. Spooner of Leeds who states that there 'must be several thousand plants'. The species was last seen in Yorkshire one mile to the north of this site at Aughton in 1936, in quantity and in a very similar situation. The Aughton locality has been searched several times since 1936 without success. One suspects that the reason for its appearance lies in dormant seed which germinates only in certain seasons.

Two items in last year's report call for further comment. The solitary East Riding *Orchis simia* plant produced one good flowering spike as in 1974. Attempts were made to artificially pollinate it in 1974 but not this year. Nine mature fruits were produced in 1974 and one this year. Following the 1974 report that *Zostera noltii* had been found in a pool on the Humber mud-flats near Spurn, Dr. Ranwell of the Nature Conservancy visited the area in May and found the species in the Old Den region of Spurn Bight and opposite the narrow neck where it forms extensive beds. Dr. Ranwell goes on to state that the species apparently occupies much the same position in the Spurn Head region as it did in 1932 when Philip mapped it. I had missed this record in preparing the 1974 report (Philip, G., 1936, *J. Ecol.* **24**; 205-219).

Crataegus oxyacanthoides was seen near Leavening on the occasion of the Y.N.U. Excursion. Although this species is not recorded for E. Yorkshire in the *Atlas*, Professor Good (in ms.) states that it is widely distributed. There would seem to be need for a study of E. Yorkshire Hawthorns. Mr. Chicken has a number of first records for Taraxaca and Mr. K. Fenton has made interesting observations concerning *Salicornia* species at Spurn. It seems that four species occur in the area but so far only the identification of *S. dolichostachya* has been confirmed in addition to *S. europaea.*

Other records are for additional stations for uncommon species, the rarest of which are: *Lepidium ruderale, Orobanche minor* and *Bidens tripartita.*

The inclusion of a grid-square reference indicates an addition to the distribution of the species as recorded in the *Atlas*, but only species recorded for ten 10km squares or less are included.

Clematis vitalba L. Car Park, Albion St., Hull 54/02; E.C.
Ranunculus sardous Crantz Humber bank, near Easington 54/31; Mrs. J. E. Duncan.
Myosurus minimus L. Near Bubwith; E. Spooner.
Lepidium ruderale L. York city centre 44/65; Mrs. E. Bray.
Barbarea stricta Andrz. Stillingfleet 44/54; T. F. Medd.
Saponaria officinalis L. Easington village 54/31; E.C.
Salsola kali L. Humber shore, near Easington 54/31; Y.N.U. Bot. Section.
Salicornia dolichostachya Moss Saltmarsh at Spurn, 1974, 54/41; K. Fenton.
Malva neglecta Wallr. Stillingfleet 44/54; T.F.M.
Trifolium fragiferum L. Scrayingham 44/76; E.B.
Crataegus oxyacanthoides Thuill. Near Leavening 44/76; Y.N.U. Excursion.
Hippophae rhamnoides L. Humber bank, near Easington 54/31; Y.N.U. Bot. Section.
**Apium nodiflorum* (L.) Lag. x *A. repens* (Jacq.) Lag. Edge of Hornsea Mere 54/14; E.C. det. R. D. Meikle.
Blackstonia perfoliata (L.) Huds. Hessle chalk quarry 54/02; J. Killingbeck.
Orobanche minor Sm. Everthorpe 44/93; P. L. Gravett.
Orobanche elatior Sutton Everthorpe; P.L.G.
Origanum vulgare L. Leavening 44/76; Y.N.U. Excursion.
Bidens tripartita L. Near Dunswell 54/03; J. Atkins.
**Taraxacum* sp. The following taxa have been determined by Dr. A. J. Richards and all are new vice-county records:
T. spectabile Dahlst. Driffield, Keld and Wansford 54/05; S. Cliffe, 44/83; E. Chicken.
T. ancistrolobum Dahlst. Folkton Carrs 54/08; E.Ch.
T. cordatum Palmgr. Bubwith 44/73; E.Ch.
T. adsimile Dahlst. Folkton Carrs 54/08; Leavening 44/76; E.Ch.
T. melanthoides Dahlst. Driffield 54/05; E.Ch.
T. haematicum Hagl. Bubwith 44/73; E.Ch.
T. marklundii Palmgr. Bracey Bridge 54/06; E.Ch.
T. fasciatum Dahlst. Bishop Wilton 44/75; E.Ch.
T. obscuratum Dahlst. North of Sledmere 44/96; E.Ch.
T. raunkiaerii Wiinst. Ruston Parva 54/06 and Leavening 44/76; E.Ch.
T. fulviforme Dahlst. Acklam 44/76; F. Houseman.
Scirpus setaceus L. Tilmire 44/64; E.B.
Carex dioica L. Leavening 44/76; Y.N.U. Excursion.

NORTH-EAST YORKSHIRE (V.C. 62) (T. F. Medd)

Quite a few records have been received for 1975 and the following, for both V.C. 62 and V.C. 65 below, represent only a selection.

Fulmaria muralis ssp. *boraei* (Jord.) Pugsl. Hinderwell 45/71; E. Chicken det. Dr. Daker.
Veronica catenata Pennell Clifton Ings 44/55; T.F.M.
Dactylorhiza praetermissa (Druce) Soo Holtby Station 44/65; T.F.M.
D. fuchsii x *praetermissa* With the above; T.F.M.

SOUTH-WEST YORKSHIRE (V.C. 63) (D. R. Grant)

Lycopodium clavatum L. Deffer Wood, High Hoyland 44/20; Dr. L. Lloyd-Evans.
Dryopteris borreri Newm. Near Hepworth 44/01; T. S. Schofield.
Ranunculus lenormandii F. Schultz Oxspring 44/20; E. Thompson.
Rorippa sylvestris (L.) Besser Damflask Reservoir, Low Bradfield 43/29; D. R. Grant.
Chenopodium bonus-henricus L. Austonley, Holmfirth 44/17; D.R.G.
Genista anglica L. Chisley, Hebden Bridge 44/02; C. Hartley; Woolley Moor near Wakefield 44/31; R. Brook.
Ulex gallii Planch. Northcliffe Woods, Shipley 44/13; L. Magee.
Genista tinctoria L. Near Frickley Hall 44/40; Y.N.U. Excursion; P. Skidmore.
Agrimonia odorata (Gouan) Mill. Greetland, Halifax 44/02; F. Murgatroyd.
Prunus padus L. Marsden Clough, Holmfirth 44/00; T.S.
Chrysosplenium alternifolium L. Raygill Top, Lothersdale 34/94; D.R.G.
Populus tremula L. Near Hazelhead 44/20; D.R.G.
Anagallis tenella (L.) Murr. Ughill near Bradfield 34/28; E.T.
Scrophularia umbrosa Dum. Thornton-in-Craven 34/94; J. R. Hickson.
Pedicularis sylvatica L. Sykehouse 44/61; E.T.
Ballota nigra L. Cromwell Bottom, Elland 44/12; F.M.
Adoxa moschatellina L. Silkstone 44/20; L.L.E.
Hieracia determined by C. E. A. Andrews:
Hieracium strumosum (WRL) A. Ley. Thurgoland Railway Tunnel 44/11; Storrs Hill, Ossett 44/21; D.R.G.
H. vagum Jord. Storrs Hill, Ossett 44/21; D.R.G.
Schoenoplectus lacustris (L.) Palla. River Aire near Woodlesford 44/33; D.R.G.
Eleocharis acicularis (L.) Roem. & Schult. River Calder, Copley, Halifax 44/02; F.M.
Carex paniculata L. Ughill near Bradfield 43/28; D.R.G.
C. pendula L. Margery Wood, Cawthorne 44/20; L.L.E.
C. laevigata Sm. Scammonden Dam near Huddersfield 44/01; T.S.
C. lepidocarpa Tausch. Hooton Roberts 44/49; E.T.
Aira praecox L. Shepley near Huddersfield 44/11; T.S.

MID-WEST YORKSHIRE (V.C. 64) (J. R. Hickson)

It has not been a year for many outstanding finds in the vice-county, but the recorder would like to thank all those people who have sent in records during the year.

Perhaps the most interesting discovery is that of *Eleocharis austriaca* at three sites in Ribblesdale from Ribblehead to below Settle by Jeremy Roberts and others. The only previously known station in Yorkshire for this species was by the river Wharfe below Buckden.

Of the hundreds of other records received during the year, many of them from new 10km grid squares, only those new to the vice-county or from distinctly new localities are included in the following list. Other records will be filed and where appropriate, sent to the Biological Records Centre.

Lycopodium selago L. Whernside, near summit in grit scree, 34/78; J. Roberts.
Dryopteris carthusiana (Vill.) H. P. Fuchs Oughtershaw, 34/88; Miss H. Lefèvre.
Ceratophyllum demersum L. Hyles Moor near Paythorne, in concrete water trap, 34/85; J.R.H.

Sagina ciliata Fr. Between Farnham and Knaresborough, in quarry, 44/35; F. E. Branson.
Rubus echinatoides (Rogers) Sudre West Lane, Whixley, 44/45; Mrs. F. Houseman, det. A. Newton.
Alchemilla glomerulans Buser Helwith Bridge, pasture and meadow near river, 34/87; J.R. conf. W. A. Sledge and S. M. Walters.
Peplis portula L. Stocks Reservoir, top end, 34/75; D. R. Grant and T. Schofield.
Berula erecta (Huds.) Coville Bolton Bridge, river bank, 44/05; Wharfedale Nat. Soc.
Rumex maritimus L. Carlton, several plants at edge of field, 44/62; J.R.H.
Littorella uniflora (L.) Aschers. Stocks Reservoir, top end. 34/75; D.R.G. & T.S.
Taraxacum spp. determined by Dr. A. J. Richards:
**T. fulviforme* Dahlst. Ripon Parks, army training area; F.H.
**T. praevnum* Dahlst. Heyshaw near Thruscross, roadside verge, F.H.
T. praestans H. Lindb. f. North Stainley near Ripon, Col. Staveley's land; F.H.
**T. sellandii* Dahlst. Weston near Otley, on damp, broken wall; F.H.
**T. linguatum* Dahlst. ex M. P. Chr. & Wiinst. Ripon Parks, edge of bog; F.H.
**T. expallidiforme* Dahlst. Winksley near Ripon, hedgebank, F.H.
T. raunkiaerii Wiinst. Heyshaw near Thruscross, roadside verge; F.H.
Baldellia ranunculoides (L.) Parl. Hyles Moor, in ditches, 34/85; J.R.H.
Juncus subnodulosus Schrank Hellifield, in Gallaber Syke, 34/85; J.R.H.
Eleocharis austriaca Hayek Settle, at two sites near R. Ribble below railway bridge, 34/86; J. R.; Ribblehead, in Salt Lake Quarry, 34/77; M. Smith & J. R., all conf. S. M. Walters.
Festuca pratensis Huds. x *Lolium multiflorum* Lam. Acaster Ings, 44/54; T. F. Medd, 1974, conf. C. E. Hubbard.
Vulpia myuros (L.) C. C. Gmel. Drax, power station site, 44/62; D.R.G.
Bromus erectus Huds. Bank Newton, canal bank, 34/95; J.R.H.

NORTH-WEST YORKSHIRE (V.C. 65) (T. F. Medd)

Pimpinella major (L.) Huds. Fallow field 34/98; J. A. Wood.
Linaria repens (L.) Mill. East Layton 45/11; Mrs. J. M. Holloway.
Chaenorhinum minus (L.) Lange Richmond 45/10; J.M.H.
Hieracium prenanthoides Vill. Cautley Spout 34/69; D. R. Grant, det. C. E. A. Andrews.
Taraxacum spp. determined by Dr. A. J. Richards:
Taraxacum oxoniense Dahlst. Marske in Swaledale 45/10; F.H.
T. spectabile Dahlst. as above; F.H.
T. maculigerum H. Lindb. f. as above; F.H.
T. lingulatum Dahlst. ex M. P. Chr. & Wiinst East Tanfield 44/27; F.H.
T. hamatum Raunk. Banks of River Ure, Wath 44/37; F.H.
Orchis morio L. Wanlass 44/08; F. M. Taylor

CASUALS AND ADVENTIVES (Mrs. F. Houseman)

Worthy of mention this year is *Crepis nicaeensis* Balb., a plant rarely found and according to reports this may be only the second record since 1909. The specimen has been kept at the British Museum. *Chenopodium ficifolium* Sm. does not occur often, although it may be overlooked. Michaelmas daisies (*Aster* spp.) need careful identification and these are occurring more frequently due to roadside dumping, often becoming abundantly established.
Clematis vitalba L. (61) Car park, Albion Street, Hull 54/02; E. Crackles.
Meconopsis cambrica (L.) Vig. (64) Otley tip 44/24; L. Magee; (65) Marske in Swaledale, abundant 45/10; F.H.
Lepidium ruderale L. (64) Demolition site, Headrow, Leeds 44/23; F.H.
L. latifolium L. (63) Tinsley, Sheffield 43/38; Dr. J. Hodgson.
Coronopus didymus (L.) Smith (63) Sheffield 43/38; J.H.
Rapistrum rugosum (L) Allioni (63) Potteric Carr 44/50; J.H.

Sisymbrium orientale L. (63) Fountain Street, Bradford 44/13; Mrs. D. E. Haythornthwaite.
S. altissimum L. (61) Near Barmby Moor 44/74; E.C.
Silene maritima Withering (63) Potteric Carr 44/50; J.H.
Chenopodium ficifolium Sm. (64) Roadside near Thruscross 44/15; F.H.
C. murale L. As above; F.H.
Malva pusilla Sm. (64) Collingham village 44/34; L.M.
Linum usitatissimum L. (61) High Street, Hull 54/12; E.C.
Oxalis incarnata L. (61) Fulford 44/64; Mrs. E. Bray.
Melilotus altissima Thuill. (62) Railway cutting near Holtby station 44/65; T. F. Medd.
Trifolium aureum Poll. (63) Thorne Bridge 44/61; J.H.
Fragaria x *ananassa* (64) Established, old railway embankment near Hetchell Crags 44/34; L.M.
Rosa alba L. forma (61) Old Chalk quarry, Foxholes 54/07; E.Ch. det. Dr. D. R. Melville.
Amelanchier confusa Hyland. (65) Riverbank near Richmond 45/10; Mrs. J. M. Holloway.
Pyrus communis L. As above; J.M.H.
Sedum reflexum L. (64) Railway embankment, Wetherby 44/44; Mrs. J. E. Duncan.
Epilobium adenocaulon Hausskn. (65) Old quarry, Tanfield 44/27; F.H.
E. nerterioides Cunn. (65) In shingle by River Ure. Wath 44/37; R. B. Houseman.
Oenothero stricta Ledel ex Link forma *rubicaulis* (65) By River Ure, Wath 44/37; F.H. det. D. McClintock.
Coriandrum sativum L. (61) Charlotte Street, Hull 54/12; E.C.
Heracleum mantegazzianum Somm. & Levier (64) West Garforth 44/33; D. R. Grant.
Mercurialis annua L. (63) Denaby 34/49; J.H.
Polygonum nodosum Pers. (64) Roadside near Thruscross 44/15; J.E.D.
P. cuspidatum Sieb. & Zucc. (65) Masham 44/27; (62) Filey 54/18; F.H.
Fagopyrum esculentum Moench. (61) High Street, Hull 54/12; E.C.
Lysimachia thyrsiflora L. Loxley Valley, Sheffield 43/28; D.R.G.
Buddleja davidii Franch. (61) Mytongate, Hull 54/02; High Street, Hull 54/12; Buckingham Street, Hull 54/13; E.C.
Polemonium caeruleum L. (63) Hooton Pagnell 44/40; Y.N.U. Excursion.
Borago officinalis L. (61) Roadside, Molescroft; E. Chicken.
Datura stramonium L. (63) Brockholes near Huddersfield 44/11; D.R.G.
Mimulus guttatus DC. x *luteus* L. (65) In shingle by River Ure, Wath 44/37; R.B.H. det. R. H. Roberts.
M. cupreus D'ombrain (64) Banks of River Nidd, Low Laithes 44/16; L.M.
Veronica filiformis Sm. (61) Hunmanby 54/07; near Crambe Bridge 44/75; Willow Garth, Boynton 54/11; E.Ch. (63) Thornton in Craven 34/94; D.R.G. & T. Schofield; (64) Hebden Ghyll 44/06; Brearton 44/36; F.H.; (65) Ayton Castle 44/98; E.Ch.
Symphoricarpos rivularis Suksd. (63) Edgefield near Bradfield 43/29; D.R.G. & T.S.
Senecio viscosus L. (61) Humber bank, Easington 54/31; E.C. (64) rail track, Monkton Moor; J. Oxtoby.
Solidago canadensis L. (63) Bilham sand quarry 44/40; Y.N.U. Excursion.
Aster novae-angliae L. (64) The Ings, Otley 44/24; F.H. det. Dr. P. F. Yeo.
A. lanceolatus Willd. As above.
A. novi-belgii L. (64) Roadside A1 Bramham 44/44; D.R.G. & T.S.
Conyza canadensis (L.) Cronq. (63) Sheffield 43/38; J.H.
Anthemis tinctoria L. (64) The Ings, Otley 44/24; R.B.H.
Anethum graveolens L. As above; det. D. McClintock.
Artemisia absinthum L. (61) High Street, Hull 54/12; Green Lane, Hull 54/02; E.C.
Silybum marianum (L.) Gaertn. (64) near Becca Hall, Aberford 44/43; C. Hartley.
Onopordum acanthium L. (64) Quarry Moor, Ripon 44/36; D.R.G. & T.S.
Centaurea montana L. (65) Marske in Swaledale 45/10; F.H.
Crepis nicaeenis Balb. (62) Near Hinderwell 44/71; E.Ch. det. Marshall (B.Mus.)
Helianthus annuus L. (64) Bramhope tip 44/24; L.M.
Lilium pyrenaicum Gouan (62) Near Hinderwell 45/71; E.Ch.

Poa palustris L. (63) Potteric Carr 44/50; J.H. det. Dr. Meldris.
Bromus inermis Leyss. (63) Darrington; J.H.
B. lanceolatus Roth var. *lanuginosus* (Poir) Dins. (64) Quarry Moor, Ripon 44/36; T.F.M. det. Dr. C. E. Hubbard.
Hordeum jubatum L. (64) Quarry Moor, Ripon 44/36; R.B.H.
Phalaris canariensis L. (61) Mytongate, Hull 54/02; High Street, Hull 54/12; E.C.
Setaria viridis (L.) Beauv. (61) High Street, Hull 54/12; E.C.
S. italica (L.) Beauv. (64) Bramhope tip 44/24; L.M.
Panicum miliaceum L. As above.

1976

EAST YORKSHIRE (V.C. 61) (E. Crackles)

There have been no outstanding records during 1976, just a few additional ones for uncommon species. The Y.N.U. meeting at Eastrington was very valuable in providing records for a number of species scarce in the East Riding, many of them aliens.

The inclusion of a grid-square reference indicates an addition to the distribution of a species as recorded in the *Atlas*, but only species occurring in ten 10km squares or fewer are included.

Asplenium adiantum-nigrum L. Eastbank, disused railway station, Great Hatfield 54/14; S. C. Clark.
Polystichum aculeatum (L.) Roth Kirkham Abbey 44/76; L. Magee.
Helleborus viridis L. Brantingham dale 44/93; J. Atkins.
Coronopus didymus (L.) Sm. Old railway station, Eastrington 44/83; Y.N.U. Excursion.
Rubus spp. determined by E. S. Edees:
Rubus falcatus Kalt. Brandesburton 54/14; E. Chicken.
R. echinatoides (Rogers) Sudre North Duffield 44/63; E.Ch.
R. hylocharis W. C. R. Wats. Melbourne 44/74; E.Ch.
Viscum album L. Haworth Hall, Hull, confirming an old record 54/03; J.A.
Atropa belladonna L. Newport 44/83; Y.N.U. Excursion.
Utricularia vulgaris L. Leven Canal 54/14; E. Wear.
Butomus umbellatus L. Banks of River Derwent, near Scagglethorpe 44/87; L.M.
Paris quadrifolia L. Enthorpe Wood 44/94; M. Taylor.
Ophrys apifera Huds. Near Hornsea Bridge 54/24; G. Hylands.
Eleocharis acicularis (L.) Roem. & Schult. Gravel pit, near North Frodingham 54/05; M.T.
E. uniglumis (Link) Schult. Hornsea Mere 54/14; E. Crackles.
Vulpia myuros (L.) C. C. Gmel. Disused railway line, Eastrington 44/73; Y.N.U. Excursion.

NORTH-EAST YORKSHIRE (V.C. 62) (T. F. Medd)

Coronopus squamatus (Forsk.) Aschers. Robin Hood's Bay 45/90; T.F.M.; Gristhorpe 54/08; B. T. Fewster.
Saponaria officinalis L. Linton Airfield 44/46; Y.N.U. Excursion.
Geranium lucidum L. York 44/55; T.F.M.
Ornithopus perpusillus L. Strensall Common 44/66; D. H. Adams.
Potentilla anglica x *reptans* = *P.* x *mixta* Nolte ex Reichb. Linton Airfield and Aldwark Wood 44/46; Y.N.U. Excursion. Flaxton 44/66; Castle Howard Lake 44/77; T.F.M. all det. by Dr. B. Matfield.
Agrimonia procera Wallr. Linton Airfield 44/46; Y.N.U. Excursion. Dalby Forest 44/88; T.F.M.
Peplis portula L. Hilla Green 44/99; E. Chicken.
Callitriche intermedia Hoffm. York 44/55; Y. & D. F. Nats.
Myrica gale L. Newtondale 44/88; J. R. Hickson.
Vaccinium oxycoccos L. Hole of Horcum 44/89; J. H. Gray.
Verbascum nigrum L. Sandsend 45/81; B.T.F.

Serratula tinctoria L. Whitby 45/81; B.T.F.
Picris echioides L. Newburgh Priory 44/57; T.F.M.
Lactuca virosa L. Linton Airfield 44/46; Y.N.U. Excursion.
Gagea lutea (L.) Ker-Gawl. York 44/55; Y. & D. F. Nats.
Juncus subnodulosus Schrank Newtondale 44/88; J.R.H.
Narcissus pseudonarcissus L. Brawby 44/77; L.M.
Platanthera bifolia (L.) Rich. Gundale 44/88; P. Oldfield.
Orchis ustulata L. Gundale 44/88; P.O.

SOUTH-WEST YORKSHIRE (V.C. 63) (D. R. Grant)
Osmunda regalis L. On a wall, Luddenden Foot, Halifax 44/02; F. Murgatroyd.
Cardaria draba (L.) Desv. River bank, Mexborough 43/49; D. R. Grant.
Montia sibirica (L.) Howell Thurgoland 44/20; D.R.G.
Genista tinctoria L. Canal bank, Skyehouse 44/61; Y.N.U. Excursion.
Onobrychis sativa Scop. Railway bank, Lindrickdale 43/58; T. Schofield.
Rubus chamaemorus L. Longridge Moss 44/00; F.M.
Sorbus torminalis (L.) Crantz Wadworth Wood, near Doncaster 43/59; D.R.G.
Umbilicus rupestris (Salisb.) Dandy Wadsworth Banks, Halifax 44/02; F.M.
Epilobium anagallidifolium Lam. Hallam Moss, near Sheffield 43/28; C. Waite.
Oenanthe crocata L. Barnoldswick 34/84; E. Thompson. Sykehouse, New Junction Canal 44/61; Y.N.U. Excursion.
Primula veris L. Barkisland, near Halifax 44/01; F.M.
Hyoscyamus niger L. A645 at railway crossing, Hensall 44/52; D.R.G.
Scrophularia umbrosa Dumort. Leeds and Liverpool Canal bank, Snaygill 34/94; T.S.
Lathraea squamaria L. Silkstone Fall Woods, near Barnsley 44/20; Dr. L. Lloyd-Evans.
Adoxa moschatellina L. Near Silkstone 44/20; L.L.E.
Hieracium spp. determined by C. E. A. Andrews.
Hieracium diaphanum Fr. Grassy bank, Skelmanthorpe 44/21; T.S.
H. strumosum (W.R.L.) Ley. Old railway, Barnborough, near Barnsley 44/40; D.R.G.
H. vulgatum Fr. Roadside, East Marton 34/95; T.S.
Alisma lanceolatum With. Old ox-bow, Fishlake 44/61; Y.N.U. Excursion.
Elodea callitrichoides (Rich.) Casp. Drain, as above.
Juncus subnodulosus Schrank. Canal bank, Sykehouse 44/61; Y.N.U. Excursion.
Acorus calamus L. Leeds and Liverpool Canal bank, Bradley 34/94; D.R.G.
Phragmites communis Trin. Leeds and Liverpool Canal bank, Salterforth 34/84; T.S.
Festuca altissima All. Stanelly Clouth, Todmorden 34/92; F.M.
Calamagrostis epigejos (L.) Roth. Altofts, near Wakefield 44/32; C. Hartley.

MID-WEST YORKSHIRE (V.C. 64) (J. R. Hickson)
Two discoveries of outstanding interest have been made in the vice-county this year and both of them by Mr. J. Roberts. He has searched for and found *Viola rupestris* Schmidt in a number of stations in Ribblesdale and *Juncus alpinus* L. in Ribblesdale and Airedale. They have not previously been recorded in West Yorkshire. He has also discovered a considerable extension to the range of *Eleocharis austriaca* Hayek in Wharfedale by finding a large colony below Ilkley, some 25 miles from its well-known station near Buckden.

New records for species previously recorded in fewer than ten 10 km squares since 1930 or in fewer than five 10 km squares in either western or eastern sides of the V.C. are listed below:

Equisetum hyemale L. Gisburn Forest, Ox Pasture Wood near Lower Flass 34/75; D. R. Grant & H. Hemingway.
Ranunculus circinatus Sibth. Harewood Bridge, in R. Wharfe at Mill Weir; 1st post 1930 record for 44/34; L. Magee, 1974/75.
Viola rupestris Schmidt Austwick, Clapham Lane, colony along trackside and adjacent open 'clitter' areas 34/77; J. Roberts, conf. D. H. Valentine, Stainforth, Smearsett Scar, colony of glabrescent plants on broken limestone 34/86; also typical plants on fine scree 34/76; J.R.

Ornithopus perpusillus L. Cawood, Bishop Wood; 44/53; and Drax, Power Station site 44/62; D. R. Grant.

Berula erecta (Huds.) Coville Austwick, Fen Beck 34/76; J. R. Hickson.

Oenanthe lachenalii C. C. Gmel. North Stainley, Light Water area; 44/27; Miss M. Sanderson & Mrs. D. E. Haythornthwaite.

Samolus valerandi L. North Milford, near the Grange, dyke beside route of dismantled railway; conf. of pre-1930 record 44/43; J.R.H.

Juncus subnodulosus Schrank Lawkland Moss 34/76; D.R.G., 1972.

J. alpinus L. Malham, Great Close Mire, scattered plants widespread in open gravelly areas 34/96; and Austwick, Crummackdale, frequent in open gravelly areas, often in running spring water 34/77; J.R., conf. C. A. Stace.

Luzula luzuloides (Lam.) Dandy & Wilmott Horton-in-Ribblesdale, abundant on railway banks N. of village 34/87; J.R.

Platanthera chlorantha (Custer) Reichb. Hazelwood, Hayton Wood 44/43; Castleford Nats. Excursion.

Eleocharis austriaca Hayek Ilkley, near Ben Rhydding, a large colony in a spring-fed pool between the A65 road and the R. Wharfe 44/14; J.R., conf. S. M. Walters.

Eleocharis uniglumis (Link) Schult. Halton West, plentiful near Pie Cross Plantation; 2nd record for 34/85; J.R.H.

NORTH-WEST YORKSHIRE (V.C. 65) (T. F. Medd)

Rorippa sylvestris (L.) Bess. Richmond 45/10; J. Killick.

Lathraea squamaria L. Thorpe Perrow (on *Taxus baccata*) 44/28; T.F.M.

Carex disticha Huds. Arkle 45/00; L. Magee.

Glyceria declinata Bréb. Arkle 45/00; L.M.

CASUALS AND ADVENTIVES (Mrs. F. Houseman)

Cardaria draba (L.) Desv. (64) Quarry Moor, near Ripon 44/36; R. B. Houseman.

Iberis umbellata L. (63) Fartown, Huddersfield 44/11; Mrs. J. Lucas.

Armoracia rusticana Gaertn., Mey. & Scherb. (63) Huddersfield 44/11; J.L.

Sisymbrium altissimum L. (63) Off Leeds Road, Huddersfield 44/11; J.L.

Impatiens capensis Meerburgh (62) Castle Howard Lake 44/77; T. F. Medd.

Medicago falcata L. with *M. falcata* L. x *M. sativa* = *M.* x *varia* Martyn (61) Near North Bridge, Hull 54/12; E. Crackles.

Coronilla varia L. Railway bank, Luddenden, Halifax 44/02; F.M.

Galega officinalis L. (61) Bombed site, Green Lane, Hull 54/02; E.C.

Psoralea cinerea Lindl. (63) Shoddy dump, Colne Bridge 44/30; Rev. C. E. Shaw.

Potentilla norvegica L. (63) Off Leeds Road, Huddersfield 44/11; J.L.

Epilobium adenocaulon Hausskn. (62) Aldewark 44/46; Y.N.U. Excursion; (65) Bedale 44/28; J. Killick.

Bupleurum lancifolium Hornem. (62) York 44/65; Pickering 44/78; W. Bramley. (63) Huddersfield 44/11; J.L.

Petroselinum crispum (Mill.) Nyman (64) One plant, roadside, Bolton Abbey 44/05; J. R. Hickson.

Heracleum mantegazzianum Somm. & Levier (61) Roadside, Thwing 54/07; E. Chicken.

Anethum graveolens L. (61) By seed warehouse, High Street, Hull 54/12; E. Crackles.

Ledum groenlandicum Oeder Longridge Moss 44/00; F.M.

Pulmonaria longifolia (Bast.) Bor. (64) Aldborough quarry 44/46; Mrs. P. Abbott.

P. officinalis L. (64) Waste ground, Curly Hill, Ilkley 44/14; F.H.

Cuscuta campestris Yunk. (61) In herb seed, garden, Cottingham 54/03; E.C.

Datura stramonium L. (61) Leeds Road, Hull 54/13; E.Ch.

Verbascum nigrum L. (64) Roadside, Camblesforth 44/62; D. R. Grant.

Linaria repens (L.) Mill. (61) Old railway station, Eastrington 44/83; Y.N.U. Excursion. (64) Newland, disused railway track 44/62; D.R.G.

Veronica filiformis Sm. (64) Aldborough quarry 44/46; R.B.H.; by River Wharfe at

Knotford Nook 44/24; F.H.; (65) By River Ure between Charlcott and Kilgram Grange 44/28; J. Oxtoby.

Galinsoga parviflora Cav. (61) Fulford 44/64; D. Ungley; (62) Garden weed, Easingwold 44/56; E.C.

Inula helenium L. (64) High Skyreholme 44/06; Miss H. Lefevre.

Chrysanthemum parthenium (L.) Bernh. (63) Off Leeds Road, Huddersfield 44/11; J.L.

Cichorium intybus L. (64) Roadside near Bolton Abbey 44/05; J.R.H.

Ruscus aculeatus L. (61) Nafferton railway station 54/05; J. Rushton. (64) Hackfall 44/27; F.H.

Allium carinatum L. (64) Roadside, Kingsdale 44/77; J.L.

Galanthus allenii L. (64) Naturalised, Copgrove 44/36; F.H. det. D. McClintock.

Crocus tomasinianus Mill. (64) Hedge bottom, Whixley 44/45; J.O.

Avena ludoviciana Durieu (61) Waste ground, centre of Hull 54/02; E.Ch.

BRYOLOGY

1975 (F. E. Branson and M. Dalby)

Two bryological meetings have been held during the year. The spring meeting was at Grass Woods, Grassington (V.C. 64) especially to assess the bryophyte flora of the Nature Reserve and the autumn meeting was at Barnard Castle for the examination of Deepdale and Sleightholme Beck (V.C. 65). Both were enjoyable meetings fully reported elsewhere.

Only a limited amount of collecting has been done this year by the recorders but two old records of J. Nowell's came to light from the Cliffe Castle Museum which were new county records:

Cryphaea heteromalla (63) Broughton Hall, Skipton 34/95; J. Nowell 1860.

Pylaisia polyantha (63) Old thorns, Broughton, Skipton 34/95; J. Nowell 1856.

In addition two new records during the year were:

Campylopus introflexus (65) Old railway, God's Bridge, Bowes on Y.N.U. excursion 35/91; J. Robertson, July 1975.

Bryum flaccidum (64) On willow near R. Wharfe, Cocken End, Ilkley 44/04; M. Dalby, August 1975.

Mr. F. E. Branson has continued his research at the Knaresborough Nature Reserve adding a number of new species including *Dicranella staphylina,* previously reported only once before at Stocks reservoir, *Bryum pendulum*, *B. inclinatum*, *Weissia controversa* and *Mnium marginatum*. Mr. D. R. Grant had a nice find of *Cratoneuron commutatum* in fruit from Littondale.

1976

The spring meeting of the Bryological section was held at Hazel Heads near Penistone on 24th April 1976, exploring a little recorded area near the banks of the R. Don. The autumn meeting had to be cancelled but it is hoped to arrange another in the near future.

MUSCI (M. Dalby)

Mr. T. Blockeel has submitted a number of records for the county including some *Orthotrichum* species which are of great interest. This group appears to have suffered from the effects of pollution and, in the case of *O. sprucei* which Mr. Blockeel records from alder near R. Ribble above Mitton Bridge, Great Mitton (V.C. 64), has no record since Mr. W. Ingham found it in V.C. 62 in 1909 near York (M.E.C. 1912. 48). Yet Dr. Braithwaite in his *British Moss Flora* (1888–1895) says "few of the N. Yorkshire streams are without this and the preceding species *(O. rivulare)*". He also adds "unfortunately it is commonly impregnated with mud, and does not make elegant herbarium specimens", so perhaps it has tended to be overlooked!

Tortula stanfordensis is another notable record. The only previous record for Yorkshire was made in 1965 when Mrs. J. A. Paton and myself found it in Jackdaw Crag Quarry near Tadcaster (V.C. 64). My report for 1965 mentions that this was only its second British

record, the first having been in 1958 on the Lizard in Cornwall. It was first discovered in California in 1951. It is now a subject for study by Dr. Whitehouse of Cambridge who is interested in its distribution and appeals for information. Its favourite habitat is on bare ground near river banks where it is subject to flooding. Since its discovery in Britain in 1958 it has been found in 15 vice-counties.

The following list of new V.C. records follows the nomenclature and sequence of the *Census Catalogue of British Mosses* (1963):

Dicranella staphylina (63) Bare ground on embankment by R. Ouse near Hook, Goole, 1975; T. Blockeel.

Tortula latifolia (63) Base of tree by R. Aire near Carleton, Skipton, 1975; T.B.

T. subulata var *subinermis* (63) Tree base by R. Aire near Carleton, 1975; T.B.

T. stanfordensis (63) Bare soil in woodland on magnesium limestone between Roche Abbey and Maltby, 1975; T.B.

Gyroweissia tenuis (63) Morter on wall, Thornton-in-Craven, 1975; T.B.

Weissia crispa (63) Bare magnesium limestone ground, Brockadale, 1975; T.B.

Grimmia alpicola var *alpicola* (63) Rocks by R. Aire west of Gargrave, 1975; T.B.

Bryum creberrinum (63) Damp log over R. Went, E. of Wentbridge, 1975; T.B.

B. radiculosum (63) Morter of wall by railway near Cononley, S. of Skipton, 1975; T.B.

B. flaccidum (63) Tree root, wood by R. Went, Brockadale, 1975; T.B.

Orthotrichum anomalum (63) Limestone wall on E. bank of canal, E. Marton, Skipton, 1975; T.B.

O. cupulatum var *nudum* (63) Stone wall, bank of R. Aire, Carleton Bridge, Skipton, 1975; T.B.

O. rivulare (64) Boulder by river about Lower Hodder Bridge, Great Mitton, 1975; T.B.

O. spruce (64) On alder by R. Ribble above Mitton Bridge, Gt. Mitton, 1975; T.B.

Plagiothecium denticulatum var. *denticulatum* (63) Stump in woodland, Sixteen Acre Plantation, near Carcroft, N. of Doncaster, 1975; T.B.

HEPATICAE (F. E. Branson)

In the early part of the year many species were found, but later on it was not possible to collect many specimens owing to the extreme dryness and lack of moisture necessary to these plants.

Two V.C. records have been made:

Lepidozia sylvatica (64) Ravensgill, near Pateley Bridge, 1976; Paton, Dalby & Branson.

Plagiochila asplendioides var *major* (63) Wood by R. Went, Brockadale, between Wentbridge and Kirk Smeaton; T. Blockeel recorded in *B.B.S. Bulletin*, No 28, July 1976.

A large number of records have been received, many most interesting, but it is impossible to mention all of them. A selection is given in the following list:

Harpanthus scutatus (64) Ravensgill, 1976; Paton, Dalby & Branson. W. bank of R. Wharfe above Strid, Bolton Abbey, 1976; Paton & Dalby.

Lepidozia trichoclados (64) Ravensgill, 1976; Paton, Dalby & Branson. W. bank of R. Wharfe above Strid, Bolton Abbey, 1976; Paton & Dalby.

Ptilidium pulcherrimum (64) On fallen trunk, Dark Walk Wood, Copgrove; F. E. Branson. Wrongly recorded as *P. ciliare* in Y.N.U. Annual Report for 1965 (*Nat.* no. 896). Askham Bog, several places, 1976; C. D. Preston. Sandgill, near Pateley Bridge, 1976; Paton, Dalby & Branson.

Splenolobus minutus (64) Ravensgill, 1976; Paton, Dalby & Branson. W. bank of R. Wharfe above Strid, Bolton Abbey, 1976; Paton & Dalby.

Metzgeria conjugata (64) Twistleton Glen, Ingleton, 1976; Paton & Dalby. Crabtree gill, Middleton, Ilkley, 1976; M. Dalby. (62) Wass Bank, 1976; F. E. Branson. The old bryologists often recorded this species, but as no records have been made for many years perhaps the species has been confused with *M. furcata*.

Leiocolea badensis (64) Farnham Quarry, Knaresborough, 1975; Branson & Dalby (conf. J. A. Paton).

Pedinophyllum interruptum (64) Twistleton Glen, Ingleton, 1976; Paton & Dalby.

BOOK REVIEWS

Problems in Vertebrate Evolution edited by **S. M. Andrews, R. S. Miles** and **A. D. Walker.** Pp. xi + 411. *Linnean Society Symposium Series*, no. 4. Academic Press. £18.50.

This volume contains the proceedings of a symposium held in January, 1976 to honour Professor T. S. Westoll, who has been for many years one of the world's outstanding vertebrate palaeontologists. The participants were a most distinguished international group and they rose to the occasion by tackling major problems in vertebrate evolution. This is a field in which bold new ideas are always possible, because most evidence is tantalizingly inconclusive. Professor Jarvik's paper is a striking illustration of this; he uses well-known fossils as the basis for an argument that the acanthodians are elasmobranchs whereas the generally accepted view is that they are teleostomes. There are few fields in which such different views on a major problem could rely on the same evidence. Other papers deal with problems concerning all the classes of vertebrates except the mammals.

The papers are on average 30 pages long and are written for the specialist reader.

R.McN.A.

Mammals in Britain and Ireland by **Terry Jennings.** Pp. 56. Black's Picture Information Books. 1977. £2.25 hardback, £1.25 paperback.

This is a useful introductory booklet to British mammals which includes an abundance of line drawings, half-tone and colour photographs. These help in the identification of our mammals and an appreciation of certain aspects of their biology. The book is divided into sections providing data on general information on mammals, pictures and descriptions and mammals and man. The quality of the photographs is generally very high. Unfortunately, some line drawings, e.g. mouse and hedgehog, do not attain a comparable standard. The author omits to mention the lesser white-toothed shrew *(Crocidura suaveolens)* from Jersey, Sark and the Isles of Scilly. In spite of these minor blemishes, this is an attractive booklet.

M.J.D.

Know the Game: Birdwatching by **Arthur Gilpin.** Pp. 40, with several black and white photographs. E.P. Publishing. 1977. Limp cover, 45p.

This booklet, one of a series outlining the basic rules and procedures of various pastimes and sports, is very well produced in modern style which makes easy reading. The Royal Society for the Protection of Birds has given the book its blessing and the Director, Ian Prestt has written a short foreword.

It is aimed at the absolute beginner who wants to join the ever-swelling ranks of bird spotters and the practical information on equipment, methods and habitats is very straightforward. The author's photographs, amongst the world's best, illustrate the book and make a pleasant publication which does what it aims to do.

The fact that Morecambe and Wise have already acclaimed it, perhaps makes my remarks superfluous.

J.R.M.

And Then They Fly Away by **Clifford Christie.** Pp. 159, with several black and white photographs. Constable. 1976. £3.95.

This chatty, sentimental book tells of the experiences of the author and his wife whilst caring for sick and injured birds. They were presumably urged to write about their ostensibly commendable efforts and the result is I suppose pleasing but makes shallow reading.

We are fortunate that there are people who care about injured animals but any illusion on their part that the result of their dedicated labours will be to return a viable unit to the wild on every occasion is largely unfounded and based on excusable optimism. The title may be basically true but having "flown away", many of the birds will succumb in a competitive environment. The author admits to occasional failure and such is inevitable especially with insectivorous species. More robust birds such as the perennial "orphaned" owlet will manage well and can often be returned successfully. Many others will be suffering from natural diseases and death will result whatever help is given.

The book does not pretend to give practical hints on how to care for sick or injured birds, but simply details the case histories in expanded diary form.

J.R.M.

Plant Life by **C. T. Prime**. Pp. 160. Collins Countryside Series. 1977. £2.50.

This is a book I would have liked to have been given in my teens. But it is only recently that it has become possible to make a cover of waterproof cloth and print on it a beautiful colour photograph of primroses in coppice woodland, and to reproduce pin-sharp photographs of wild flowers — true plant portraits by a number of skilled photographers — as plates in the text. And it has taken Dr. Prime much of his lifetime as a teacher and field botanist to acquire the wisdom, knowledge and skill which he deploys apparently so effortlessly here. He manages to convey that whereas the natural world is usually more complex than it appears at first sight, it is perfectly possible and also very satisfying to find out about it for oneself. Quite unpretentiously he discusses woodlands, grasslands, heaths and commons, marshes and fens, maritime and other habitats, mainly in lowland Great Britain, for as he says, that is where most people live. In doing so he conveys much useful and interesting information about plants and how to know them. In addition to more than fifty photographs there are as many excellent line drawings by Marjorie Blamey. It is to be hoped that teenagers today will realise how lucky they are.

F.H.B.

The Observer's Book of Lichens by **Kenneth L. Alvin**. Pp. 188, with 53 colour illustrations and 109 black and white photographs and diagrams. Warne. 1977. £1.10.

One welcomes the reappearance of this work, particularly in a second edition which takes some account of the considerable advance in our knowledge of the taxonomy, ecology, etc. of lichens since the book's first appearance in 1963.

Although the new edition has 40% more pages and smaller type than its predecessor, it covers less taxa (175 v. 179) in the text and illustrates fewer (142 v. 151). Keys for the determination of many lichens to generic level are provided, but the newly-introduced major sub-division into 'semi-erect' forms is imprecise. As in the previous edition the quality of the figures and plates is variable: Claire Dalby's illustrations of macrolichens are excellent, but several crustose species (e.g. *Protoblastenia rupestris, Caloplaca citrina, Candelariella vitellina*) are still poorly portrayed, differentiation of particular species that may normally be accomplished via photographic interpretation (e.g. *Parmelia saxatilis* and *P. sulcata*) is sometimes difficult, some higher magnifications (e.g. *Xanthoria candelaria*) show no further detail over the lower magnifications, and some scales (e.g. page 109) are inaccurate. A few important errors (e.g. *Usnea rubiginea* on page 29 = *U. rubiginosa* on pages 43 and 188), and several typographical inconsistencies have been noted.

The section 'Books for Further Reading and Reference' is deficient; it is a disservice to naturalists that such works as Richardson's *The Vanishing Lichens*, Dahl and Krog's *Macrolichens of Denmark, Finland, Norway and Sweden*, Brightman and Nicholson's *The Oxford Book of Flowerless Plants*, Hawksworth and Rose's *Lichens as Pollution Monitors*, D. C. Smith's *Lichen Symbiosis*, and the major works of A. L. Smith (including the recent reprints) have been omitted. Furthermore, details of the activities of the British Lichen Society should also have been provided. A more judicious use of available space would have obviated many of the faults noted above.

Despite these misgivings, this handy book will be an important aid to the field naturalist, and will stimulate a wider interest in this fascinating subject.

M.R.D.S.

Introduction to Fungi by **John Webster**. Pp. viii + 424, with 242 line drawings and photographs. Cambridge University Press. 1977. Paperback, £4.95.

The many outstanding qualities of the hardback edition of this work have been more than adequately expressed by a previous reviewer in this journal (*Naturalist*, 1971, p. 75). Many, especially undergraduates and college students, will be pleased to see its first appearance as a paperback edition.

An Introduction to Biological Rhythms by **John D. Palmer**, with contributions by Frank A. Brown and Leland N. Edmunds. Pp. xviii + 375. Academic Press, New York. 1977. £13.85.

Biological Rhythms is in every sense an American text: it is outstanding in showing the 'big picture' but appallingly jargon-ridden! We are introduced, for example, to "temperature-sensitivity phase-response rhythms" at the outset, and to clarify matters the author suggests that "before delving any deeper into the subject, it would simplify matters greatly to momentarily digress to a discussion of basic terminology and the standard means of picturing oscillatory behaviour in physiological manifestations". There is no answer to that.

Despite this and many other aberrations of language the book is a very good read, and an excellent introduction to the fascinating literature on biological rhythms which has appeared in recent years. The book covers animals, plants and humans, and gives many examples of tidal, circadian, monthly and annual patterns. There is an entertaining section on jet-lag and business performance.

Perhaps the best part is the chapter reviewing the factors affecting animal orientation during migration. Palmer shows how clock-compensated sun navigation and navigation on magnetic and astrolocal reference points work in various species.

The final two chapters are contributed by two experts holding opposing views on the nature of the biological clock. The first attempts to convince us that the clock is external, simply tracking as yet unidentified environmental periodicity, and the second that it is internal, based probably on membrane biochemistry. These two sections are altogether different from the main body of the text: to the outsider they appear over-technical and over-concerned with jargon.

The price will again, I am afraid, reinforce the publishers' self-fulfilling prophecy of low sales. This is a pity, because the book is a highly readable collection of fascinating biological studies from dancing bees who can tell the time, to fiddler crabs who remember the times of high and low tides for months after incarceration in a darkened box.

M.J.C.

Applied Biology, edited by **T. H. Coaker**. Volume II. Pp. x + 272. Academic Press, London. 1977. £9.80.

The second volume of this series (see *Naturalist*, **102**, 124) contains important papers on (1) Soil aeration and compaction in relation to root growth and soil management, (2) Creation of new models for crop plants and their use in plant breeding, (3) Some aspects of the design and management of reservoir margins for multiple use, and (4) The European rabbit, the European rabbit flea and myxomatosis. The third of these contributions will be of particular interest to the environmentalist.

Rocks by **David Dineley**. Pp. 160. Collins. 1977. £2.50.

It is a refreshing change to find a book which is thoroughly readable yet has enough information in it to satisfy the needs of any person wishing to learn about rocks for the first time. This book, which is the latest in Collins' successful Countryside Series, covers a vast subject in one slim volume, yet manages to amalgamate the essential and fundamental points and present them in an uncomplicated way, so sadly lacking from many modern textbooks.

The book commences with a section on matter and minerals, and briefly introduces the difficult subject of crystallography. This is followed by chapters on the essential rock-forming minerals and on metallic ores. The rest of the book deals separately with the igneous, sedimentary and metamorphic rocks and it finishes with two chapters on fossils and one on geological cycles. The use of many line drawings and black and white photographs additionally enhance the liveliness of the text. Further books in this series by David Dineley will be awaited with eager anticipation.

P.M.E-B.

A Guide to the Cleveland Way and Missing Link by **Malcolm Boyes**. Pp. 166, including 14 Ordnance Survey Maps and 40 monochrome photographs. Constable. 1977. £2.95.

An eminently practical and attractive guide to the popular Cleveland Way walk, plus an additional 50-mile extension to it on rights-of-way and Forestry Commission paths which offers an alternative circular route. Each stretch of the walk is sensibly designed to end at a place within reach of overnight accommodation. Excellent descriptions of each section are enlivened with a wealth of pertinent information on the local history of the area, and on any interesting natural features or buildings encountered on the way, illustrated with the relevant Ordnance Survey Map, plus numerous photographs taken by the author.

The book can be confidently recommended to walkers new to the area; those already familiar with the region will almost certainly find that it adds much to their existing knowledge. The handy pocket format adds a final practical touch.

V.A.H.

The Country Diary of an Edwardian Lady by **Edith Holden**. Pp. 186. Michael Joseph. 1977. £5.50.

This is a pretty, period keepsake book, but no serious naturalist should be tempted into thinking that it will serve any function except that of decorating the coffee-table. It is a meticulously produced facsimile (stains and all) of an illustrated nature diary cum commonplace book for 1906 by Edith B. Holden (1871–1920); a very brief note on the dust-jacket provides the only information about her.

Perennials for Cutting by **John Jeffreys.** Pp. 224, with line drawings by **Yvonne Skargon.** Faber and Faber. 1977. £4.95.

A book of somewhat limited appeal. The author has striven to introduce a new angle to justify yet another book on perennials, but its usefulness to the majority of flower arrangers is questionable, unless they also happen to be keen gardeners and plantsmen with a fairly large area of garden at their disposal. A generous number of good illustrations would seem essential to this type of book, but in this instance they are not only few and far between but the choice of subject seems completely arbitrary. Furthermore, most would convey little of the plant's potential as a cut flower to the arranger not already familiar with it: for instance, one might well assume from its illustration on p. 54 that the aquilegia (columbine) has solitary short stemmed flowers suitable only for small posies.

V.A.H.

Edward Thomas on the Countryside. A selection of his prose and verse, edited by **Roland Gant.** Pp. 183. Faber and Faber. 1977. £4.95.

Edward Thomas' reputation, especially as a poet, has been growing steadily over the years since his premature death in Flanders in 1917. All too many of his prose works are out of print today, and are much sought after by collectors. This attractive selection of his prose and poetry, which concentrates on his interpretation of the countryside, is therefore particularly welcome. Living in acute poverty after his marriage, entirely dependent on his writing to earn a bare living, nevertheless little trace of his mental and physical struggle to survive is evident in his serene studies of the pre-1914 countryside. Few of his poems were published until after his death, but they won immediate and increasing acclaim for their outward simplicity and inner complexity. "I love birds more than books" he wrote as a schoolboy, but he grew up to write books that have a lasting place in our affections, even though much of the countryside he described has vanished for ever.

V.A.H.

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